

S6161-M3-FSE-010

0910-LP-236-4800

TECHNICAL MANUAL

MODEL

V1401

DESCRIPTION

Mixing Machine, Food, Electric
NSN 7310-01-104-7823
440V 60HZ 3PH
I/A/W FED SPEC 00-M-0038K and
as amended

Contracts:

DLA400-87-C-2000

Contractor:

Gill Marketing Company, Inc.

11320 Frederick Avenue

Beltsville, MD 20705

Manufacturer:

Hobart Corporation

World Headquarters

Troy, OH 45374

Manual Approved:

20 Jan 89 ✓

0910LP2364800



S6161-M3-FSE-010

INSTRUCTIONS

MODELS M802 & V1401 MIXERS

ML-33482 - 33485 M802
ML-33490 - 33494 V1401



WORLD HEADQUARTERS
TROY, OHIO 45374

Installation, Operation, and Care of MODELS M802 and V1401 MIXERS

SAVE THESE INSTRUCTIONS

GENERAL

The M802 mixer is a heavy duty 80 quart mixer with a 3 horsepower motor and a timer as standard equipment. Other standard features include a clutch, power bowl lift, and mixing light. With the use of bowl adapters and special agitators, 30, 40, or 60 quart bowls may be used on the M802. This mixer is also available with a 14" higher than standard pedestal.

The V1401 mixer is a heavy duty 140 quart mixer with a 5 horsepower motor and a timer as standard equipment. Other standard features include a clutch, power bowl lift, and mixing light. With the use of bowl adapters and special agitators, 30, 40, 60, 80, or 100 quart bowls may be used on the V1401. This mixer is also available with a 17" higher than standard pedestal.

These mixers can be ordered with deluxe finish, which includes a burnished aluminum transmission case and nickel-chrome plated top cover, planetary, and drip cup.

A variety of attachments and accessories is available for all mixers and these are described in a separate *Use and Applications Handbook* which is furnished with each mixer.

INSTALLATION

UNPACKING

Immediately after unpacking the mixer, check it for possible shipping damage. If this machine is found to be damaged after unpacking, save the packing material and contact the carrier within 15 days of delivery.

Prior to installation, test the electrical service to assure that it agrees with the specifications on the machine data plate.

LOCATION

Place the mixer in its operating location. There should be adequate space around the mixer for the user to operate the controls and install and remove bowls. The area above the mixer should allow the top cover to be removed for routine maintenance and servicing.

Holes are provided in the base for permanent bolting to the floor, although this is not necessary in normal installations. Four plastic plugs are supplied with the mixer to plug these holes if they are not used.

Once located, the mixer must be leveled.

Remove the top cover screws and the top cover.

Place a level on the machined surface of the transmission case (Fig. 1) and slide shims under the legs (base) of the mixer as required to level it front-to-back and side-to-side.

Do not replace the top cover until installation is completed.

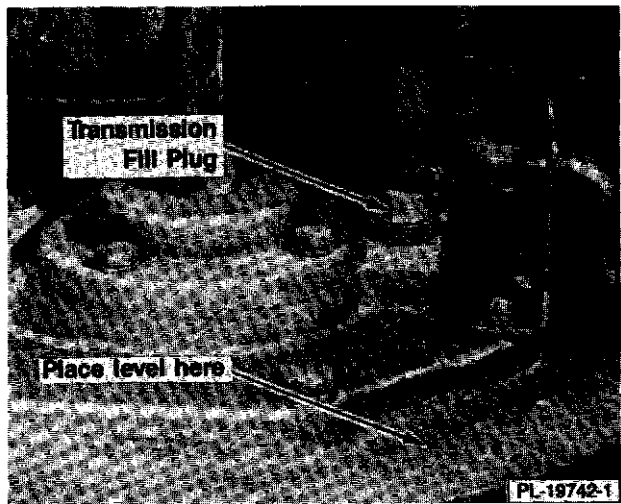


Fig. 1

LUBRICATION

This mixer is shipped with oil in the transmission and planetary. The transmission contains 1 gallon of Gearep #140; the planetary contains 6 ounces of Gearep #85. Check oil levels before starting mixer. Refer to Maintenance Section for oil level and filling procedure.

ELECTRICAL CONNECTIONS

WARNING: ELECTRICAL AND GROUNDING CONNECTIONS MUST COMPLY WITH THE APPLICABLE PORTIONS OF THE NATIONAL ELECTRICAL CODE AND/OR OTHER LOCAL ELECTRICAL CODES.

WARNING: DISCONNECT ELECTRICAL POWER SUPPLY AND PLACE A TAG AT THE DISCONNECT SWITCH INDICATING THAT YOU ARE WORKING ON THE CIRCUIT.

BRANCH CIRCUIT SIZE AND PROTECTION

**MODEL M802
DUAL ELEMENT TIME-DELAY FUSE**

VOLTS	PHASE	MINIMUM CIRCUIT AMPACITY	MAXIMUM FUSE SIZE	60°C COPPER WIRE SIZE
200	1	35	35	8
230	1	30	30	10
200	3	20	20	12
*230	3	20	20	12
*460	3	15	10	14

MODEL V1401
DUAL ELEMENT TIME-DELAY FUSE

VOLTS	PHASE	MINIMUM CIRCUIT AMPACITY	MAXIMUM FUSE SIZE	60°C COPPER WIRE SIZE
200	1	50	50	6
230	1	40	40	8
200	3	25	25	10
*230	3	25	25	10
*460	3	15	15	14

*Can be field rewired for alternate voltage (i.e., 230 volt mixers can be rewired for 460 volts and vice versa). Contact your local Hobart Service Office if this is required.

NOTE: The above information compiled in accordance with the National Electrical Code, 1984 Edition.

A junction box with $\frac{3}{4}$ " pipe tap is located at the top of the pedestal. Make electrical connections per the wiring diagram supplied with the unit.

Three-phase machines must be connected so the planetary rotates in the direction of the arrow on the drip cup. To check rotation:

Set the gear shift lever on 1.

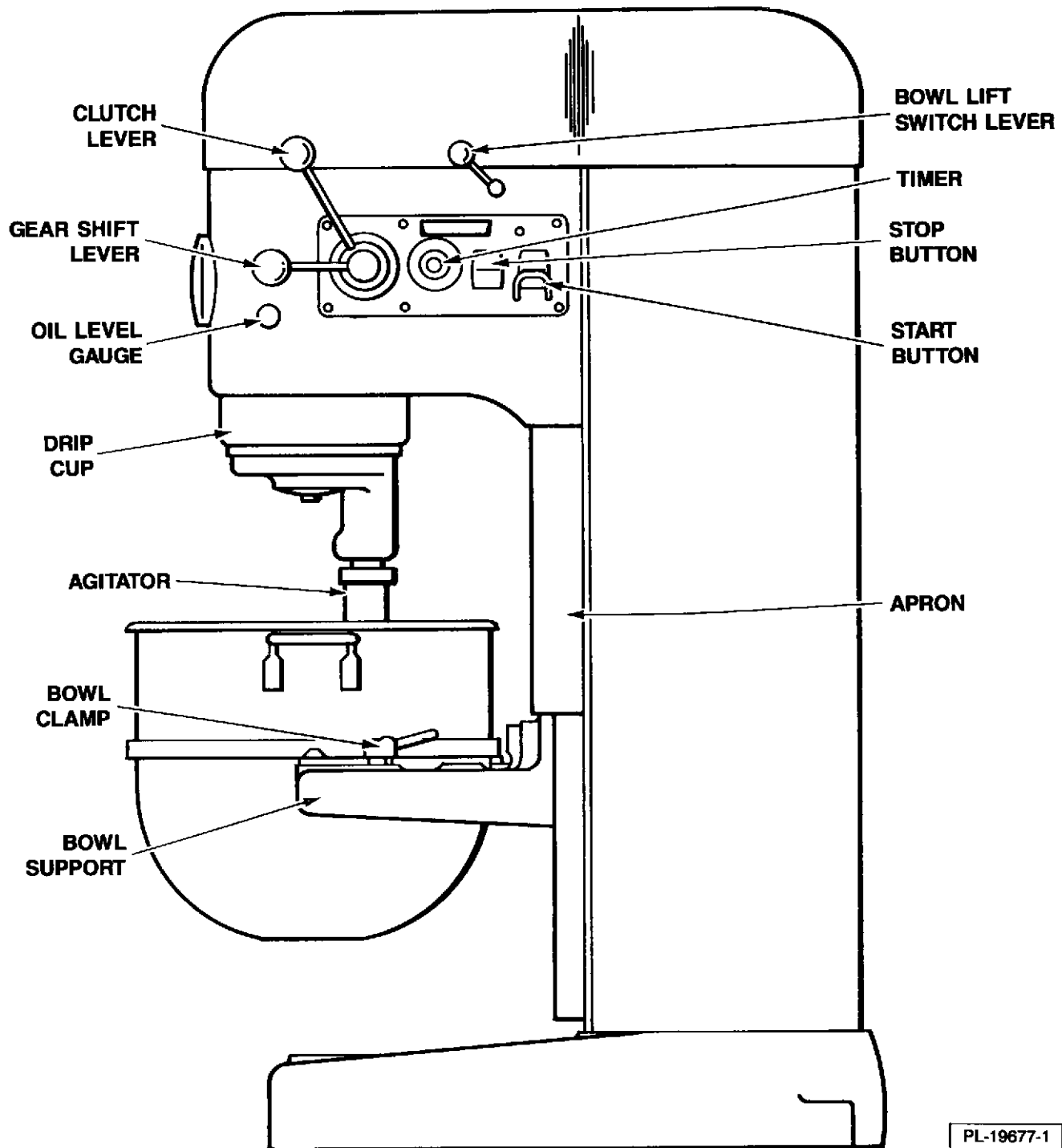
Apply power to the mixer, set the timer on *HOLD*, and momentarily run the machine by pushing the *START* and then *STOP* buttons.

If rotation is incorrect, DISCONNECT ELECTRICAL POWER SUPPLY and interchange any two of the incoming power supply leads.

OPERATION

WARNING: MOVING BEATER IN BOWL. KEEP HANDS, CLOTHING, AND UTENSILS OUT WHILE IN OPERATION.

In order to fully understand the operation of your mixer, you must be familiar with the items identified on this page. These items, which are referenced throughout the OPERATION section, are printed in *italic type* the first time they appear.



CONTROLS

The *START BUTTON* is used to start the mixer.

The *STOP BUTTON* is used to stop the mixer.

The *CLUTCH LEVER* is used when changing speeds. Moving the clutch lever to *STOP* disengages the clutch and activates a brake which stops the planetary. The motor will continue to run with the clutch lever on *STOP* unless the *STOP* button is pressed.

The *GEAR SHIFT LEVER* is used to change speeds. To change speeds, disengage the clutch by moving the clutch lever to *STOP*. The brake is automatically actuated. When the agitator shaft has stopped, move the gear shift lever to the desired speed. Make sure the gear shift lever lines up with the number on the shifter plate — **never position the handle between numbers**. Place the clutch handle on *RUN* to continue operation.

The *TIMER* is used in conjunction with the *START* button for timed mixing operations and will stop the mixer when a preset time has elapsed.

For timed mixing — Place the clutch lever on *STOP* and set the gear shift lever at the desired speed. Set the timer at the desired time and press the *START* button to start the motor. Move the clutch lever to *RUN* to start mixing.

If you need to stop the mixer before the time has elapsed, move the clutch lever to *STOP* and press the *STOP* button. To resume mixing, press the *START* button and move the clutch lever to *RUN*.

For non-timed mixing — Place the clutch on *STOP* and set the gear shift lever at the desired speed. Set the timer on *HOLD* and press the *START* button to start the motor and move the clutch lever to *RUN* to start mixing. To stop the mixer, move the clutch lever to *STOP* and press the *STOP* button.

The power bowl lift, which is controlled by a *SWITCH LEVER*, is used to raise or lower the bowl with the motor running. **CAUTION: Before lowering the bowl onto a bowl truck, always unlock both bowl clamps.**

To use the power bowl lift, move the clutch lever to *STOP*. Place the timer on *HOLD*, press the *START* button, and move the switch lever clockwise to raise the bowl or counterclockwise to lower it. An overload slip clutch will ratchet at the top and bottom stop positions to signal end of travel and protect the operating mechanism. **NOTE:** On new machines, the power bowl lift switch lever may need to be manually returned to the center neutral position until parts are broken in.

In case of a power failure, the bowl may be raised or lowered manually. Remove the *apron* (secured by thumb screws) and use a 1" open end wrench to turn the lift screw hex in the desired direction.

MIXING

This section explains operation of the mixer and how to install bowls, agitators, and attachments. A separate *Use and Applications Handbook* is provided with the mixer which contains information on mixing procedures, as well as outlining specific uses for agitators, attachments, and accessories.

Bowl

New mixer bowls and agitators (beaters, whips, and dough arms) should be thoroughly washed with hot water and a mild soap solution, rinsed with either a mild soda or vinegar solution, and thoroughly rinsed with clear water **BEFORE** being used. This cleaning procedure should also be followed for bowls and agitators before whipping egg whites or whole eggs.

The bowl must be installed before the agitator.

To install the bowl, fully lower the *bowl support*. Position the bowl so the alignment bracket on the back of the bowl is under the retainer on the bowl support and the *alignment pins* on the front of the bowl support fit in the holes in the bowl. Lock the bowl in place by rotating the *bowl clamps* over the ears of the bowl.

If a bowl adapter is required, install it on the bowl support as you would the bowl and then install the bowl on the adapter.

Agitator

To install an *agitator*, the bowl must be installed and fully lowered. Place the agitator in the bowl, push it up on the agitator shaft, and turn it clockwise to seat the shaft pin in the slot of the agitator shank.

Attachments (Mixers With Attachment Hub)

ALWAYS place the clutch handle on *STOP* and press the *STOP* button before installing or removing attachments.

To install an attachment, loosen the attachment hub thumb screw and remove the plug. Insert the attachment into the attachment hub, making certain that the square shank of the attachment is in the square driver of the mixer. Secure the attachment by tightening the thumb screw.

Move the gear shift lever to the desired speed, move the clutch handle to *RUN*, and start the mixer to operate the attachment.

The meat and food chopper attachment should be operated in second or third speed. If material in the cylinder stalls the mixer, push the *STOP* button at once. DO NOT attempt to restart the mixer in a lower speed — remove the adjusting ring, knife, plate, and worm and clear any obstruction. THIS ATTACHMENT MUST NOT BE USED TO CHOP BREAD CRUMBS.

Mixer Speeds

Speed 1 (Low) — This speed is for heavy mixtures such as pizza dough, heavy batters, and potatoes.

Speed 2 (Medium-low) — This speed is for mixing cake batters, mashing potatoes, and developing bread dough.

Speed 3 (Medium-high) — This speed is for incorporating air into light batches, as well as finishing whipped items.

Speed 4 (High) — This speed is for maximum and accelerated air incorporation into light batches.

CLEANING

A bowl scraper and brush are furnished to aid in cleaning bowls and agitators.

The mixer should be thoroughly cleaned daily. DO NOT use a hose to clean the mixer — it should be washed with a clean damp cloth. The base allows ample room for cleaning under the mixer. The *apron* may be removed by loosening the thumb screws.

The *drip cup* (which is secured by two thumb screws) should be removed periodically and wiped clean.

Mixing Heavy Dough

The moisture content of heavy dough is a critical factor when selecting proper mixing speed. You should never use 2nd speed when mixing heavy dough with an Absorption Ratio (AR) or 50% or less.

To determine the Absorption Ratio (AR) of a product, divide the water weight by the flour weight.

Example: Calculate the Absorption Ratio of a mixture containing 12 lbs. of flour and 6 lbs. of water.

$$12 \sqrt{\frac{.50}{6.00}} = 50\% = \text{AR}$$

Mixer Capacity Chart — Models M802 & V1401

Recommended Maximum Capacities

PRODUCT	AGITATORS SUITABLE FOR OPERATION	M802	V1401
CAPACITY OF BOWL (QTS. LIQUID)		80	140
		CAPACITIES — SINGLE BATCHES	CAPACITIES — SINGLE BATCHES
Egg Whites	D	2 qts.	4 qts.
Mashed Potatoes	B & C	60 lbs.	100 lbs.
Mayonnaise (Qts. of Oil)	B or C or D	30 qts.	50 qts.
Meringue (Qty. of Water)	D	3 qts.	5 qts.
Waffle or Hot Cake Batter	B	32 qts.	—
Whipped Cream	D or C	16 qts.	30 qts.
Cake, Angel Food (8-10 oz. cake)	C or I	60	120
Cake, Box or Slab	B or C	100 lbs.	185 lbs.
Cake, Cup	B or C	125 dz.	235 dz.
Cake, Layer	B or C	90 lbs.	165 lbs.
Cake, Pound	B	100 lbs.	185 lbs.
Cake, Short (Sponge)	C or I	80 lbs.	150 lbs.
Cake, Sponge	C or I	65 lbs.	140 lbs.
Cookies, Sugar	B	125 dz.	225 dz.
Dough, Bread or Roll (Lt.-Med.) 60% AR §	ED	170 lbs.**	210 lbs.**
Dough, Heavy Bread 55% AR §	ED	140 lbs.**	175 lbs.**
Dough, Pie	B & P	75 lbs.	125 lbs.
Dough, Thin Pizza 40% AR (max. mix time 5 min.) § ‡	ED	85 lbs.*	135 lbs.*
Dough, Med. Pizza 50% AR § ‡	ED	155 lbs.*	190 lbs.*
Dough, Thick Pizza 60% AR § ‡	ED	155 lbs.**	190 lbs.**
Dough, Raised Donut 65% AR	ED	60 lbs.***	100 lbs.***
Dough, Whole Wheat 70% AR	ED	150 lbs.**	185 lbs.**
Eggs & Sugar for Sponge Cake	B & C or I	40 lbs.	75 lbs.
Icing, Fondant	B	65 lbs.	100 lbs.
Icing, Marshmallow	C or J or I	10 lbs.	20 lbs.
Shortening & Sugar, Creamed	B	65 lbs.	120 lbs.
Pasta, Basic Egg Noodle (max. mix time 5 min.)	ED	65 lbs.****	100 lbs.**

*1st SPEED

**2nd SPEED

***3rd SPEED

§ If high gluten flour is used, reduce above dough batch size by 10%.

‡ 2nd speed should never be used on 50% AR or lower products.

NOTE: %AR (% Absorption Ratio) = Water weight divided by flour weight × 100%. Capacity depends on moisture content of dough. Above capacities based on 12% flour moisture and 70°F water temperature.

ABBREVIATIONS — AGITATORS SUITABLE FOR OPERATION

B — Flat Beater

ED — Dough Arm

P — Pastry Knife

C — Wing Whip (4-Wing)

I — Heavy Duty Wire Whip

S — Sweet Dough Arm

D — Wire Whip

J — Wing Beater

MAINTENANCE

WARNING: DISCONNECT ELECTRICAL POWER SUPPLY AND PLACE A TAG AT THE DISCONNECT SWITCH INDICATING THAT YOU ARE WORKING ON THE CIRCUIT BEFORE BEGINNING ANY MAINTENANCE PROCEDURE.

LUBRICATION

Planetary

The planetary oil should be checked periodically. To check, DISCONNECT ELECTRICAL POWER SUPPLY and remove the drip cup, which is secured by two thumb screws. Remove the fill plug (Fig. 2). Oil should be even with the bottom of the fill plug hole. If it is not, slowly add *Gearep #85* until it is. Replace the fill plug and drip cup.

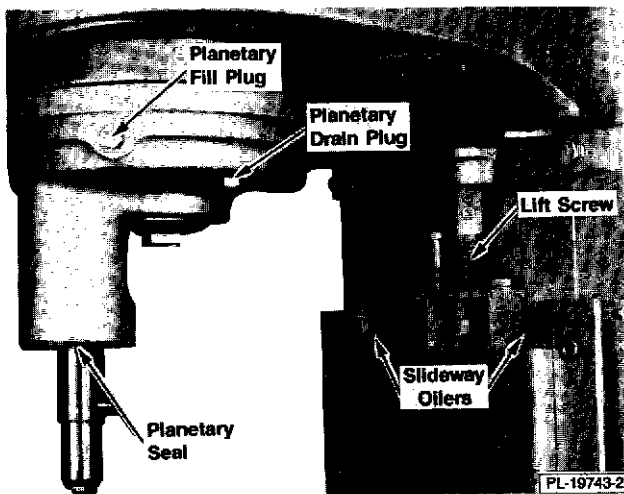


Fig. 2

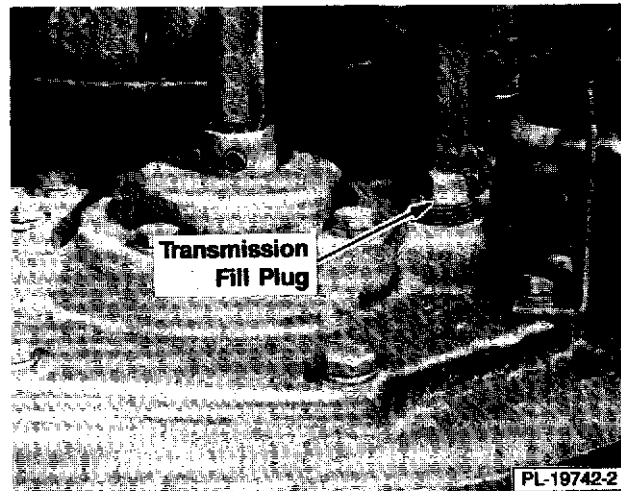


Fig. 3

A drain plug (Fig. 2) is located on the bottom of the planetary. Should draining become necessary, remove the drip cup and place a suitable catch pan under the drain plug. Remove the drain plug, allow the oil to completely drain, and replace the drain plug. Remove the fill plug and pour in 6 ounces of *Gearep #85*. Replace the fill plug and drip cup.

Planetary Seal

Occasionally, the planetary seal (Fig. 2) may become dry and begin to squeak. To correct this, work a little lubrication under the lip of the seal.

Transmission

The transmission oil should be even with the line on the *oil level gauge* when the motor is **NOT** running. If the oil falls below this line, DISCONNECT ELECTRICAL POWER SUPPLY and remove the top cover, which is secured by two screws. Remove the transmission fill plug (Fig. 3) and add a small amount of *Gearep #140* until the oil returns to the proper level. DO NOT overfill the transmission as leakage may result.

Bowl Lift

The slideways and lift screw should be lubricated two or three times per year, depending on use. To reach these areas, loosen the thumb screws securing the apron and remove the apron. Remove the inner apron by removing its screws.

Oilers (Fig. 2) are provided for lubricating the bowl lift slideways, using *Havoline #10* oil.

The lift screw (Fig. 2) is lubricated with the bowl lift fully lowered by applying a thin coat of *Lubriplate 630AA* (supplied).

Replace both aprons.

ADJUSTMENTS

Agitator Clearance

The agitator clearance should be checked with each bowl change. The agitator must not touch the bowl but there should be no more than $\frac{1}{8}$ " clearance between the bowl and agitator. To check and, if necessary, adjust the clearance:

Install a bowl and the B beater.

If the bowl and beater come into contact before the bowl lift reaches its stop, slightly lower the bowl, loosen the locking nut (Fig. 4), and turn the stop screw (Fig. 4) counterclockwise enough to prevent the bowl and beater from touching before proceeding with the adjustment.

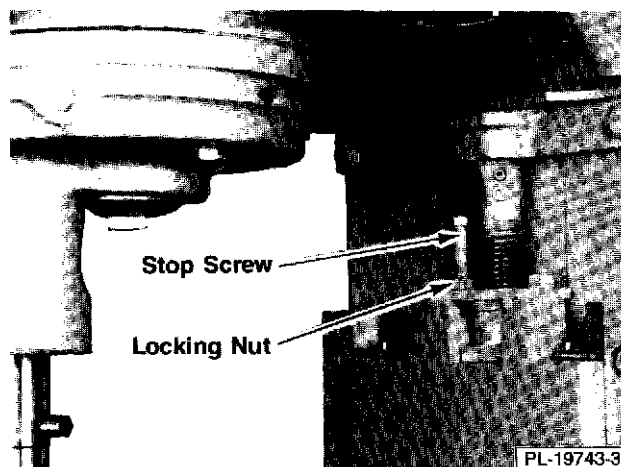


Fig. 4

Pour enough flour in the bowl to cover the bottom of the bowl where the beater travels. With the bowl fully raised, briefly run the mixer in speed 1.

Move the clutch lever to *STOP* and turn off the mixer. DISCONNECT ELECTRICAL POWER SUPPLY and measure the depth of flour where the beater has traced a path. This measurement should be taken at several points around the bowl to assure accuracy.

If an adjustment is necessary, remove the apron (which is secured by thumb screws), loosen the locking nut (Fig. 4), and turn the stop screw (Fig. 4) counterclockwise to increase the clearance or clockwise to decrease the clearance. Tighten the locking nut while holding the stop screw, and replace the apron.

Reconnect electrical power supply and operate the bowl lift several times to check the adjustment.

Bowl Clamps

The height of the bowl clamp is controlled by a spring washer and lock nut, which are located on the bottom of the bowl support. Turning the lock nut clockwise will loosen the clamp, counterclockwise will tighten it. If repeated adjustments are necessary, additional service is indicated. Contact your local Hobart Service Office.

TROUBLESHOOTING

This section contains some simple operator-oriented troubleshooting tips. If any of these symptoms appear, check the possible causes — this might eliminate the need for a service call. If the symptoms persist after possible causes have been checked, contact your local Hobart Service Office.

SYMPTOM — Mixer will not start

POSSIBLE CAUSES:

1. Gear shift lever between gears (not fully engaged).
2. Circuit protector in open position — check fuse or disconnect switch.
3. Mixer or attachment overloaded.

SYMPTOM — Agitator touches bowl

POSSIBLE CAUSES:

1. Bowl clamp(s) not closed.
2. Improper agitator clearance — see MAINTENANCE for adjustment procedure.
3. Bowl clamp(s) improperly adjusted — see MAINTENANCE for adjustment procedure.

SYMPTOM — Planetary seal squeaks

POSSIBLE CAUSE:

1. Seal requires occasional lubrication — see MAINTENANCE.



CATALOG OF REPLACEMENT PARTS

MODELS M802 & V1401 SERIES MIXERS

(INCLUDES MOTOR PARTS)

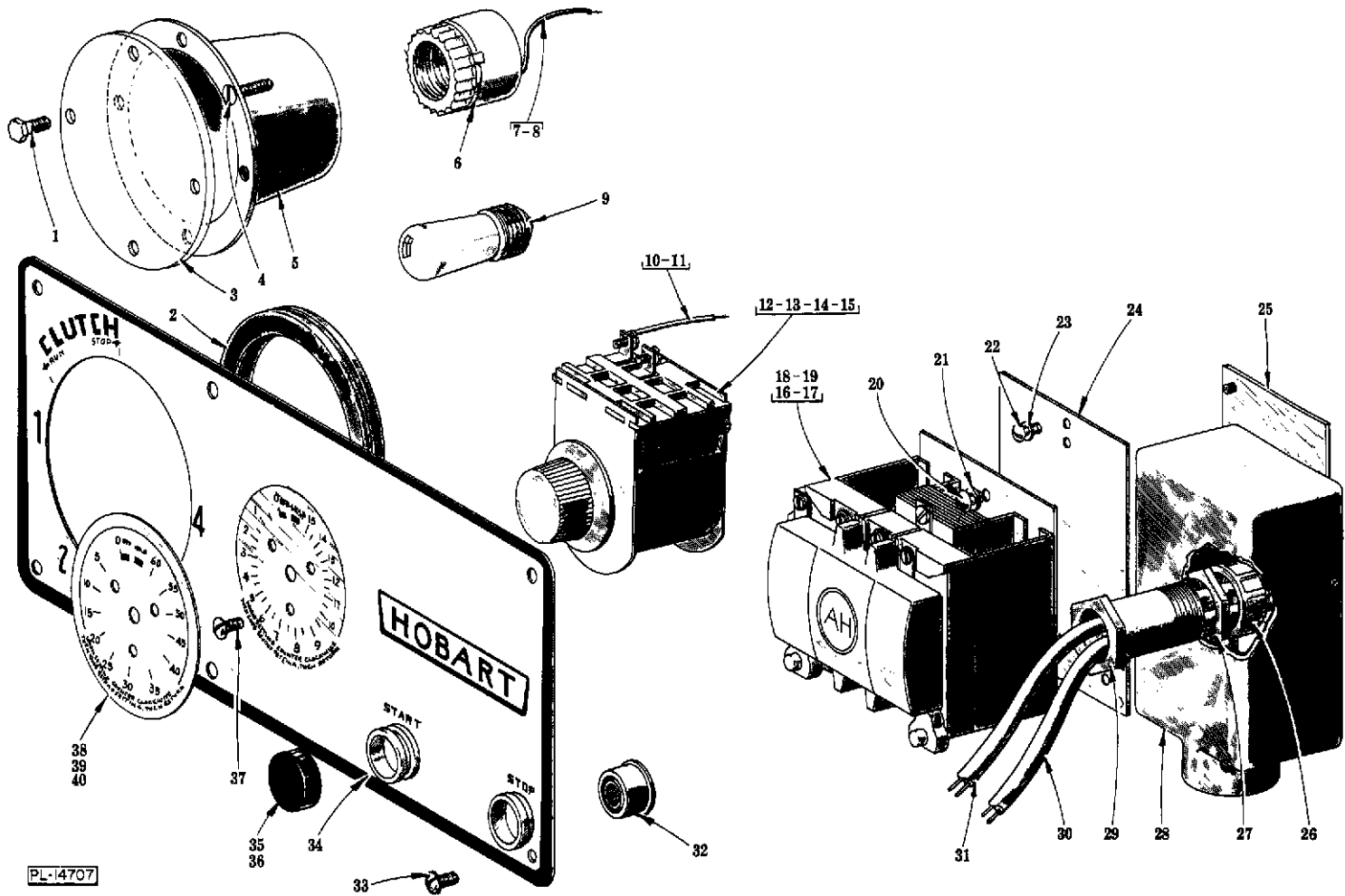
ML-33482	M802
ML-33484	M802U
ML-33483	M802 (14" Higher Than Standard)
ML-33485	M802U (14" Higher Than Standard)

ML-33490	V1401
ML-33492	V1401U
ML-33491	V1401 (17" Higher Than Standard)
ML-33493	V1401U (17" Higher Than Standard)

THIS MANUAL REPLACES AND SHOULD BE USED
INSTEAD OF FORM 13746A (6-82) & FORM 13966 (8-81)

PRIOR ML'S COVERED IN THIS MANUAL:

ML-16449 & ML-19663	M802
ML-18820 & ML-19665	M802U
ML-16450 & ML-19664	M802 (14" Higher Than Standard)
ML-31132 & ML-19666	M802U (14" Higher Than Standard)
ML-16451 & ML-19668	V1401
ML-18821 & ML-19670	V1401U
ML-17280 & ML-19669	V1401 (17" Higher Than Standard)
ML-31133 & ML-19671	V1401U (17" Higher Than Standard)



SWITCH PLATE, TIMER AND ELECTRICAL UNIT
 (MACH. MLS 16449, 16450, 16451, 17280, 18820, 18821, 31132 & 31133)

SWITCH PLATE, TIMER, AND ELECTRICAL UNIT
(MACH. ML'S 16449, 16450, 16451, 17280, 18820, 18821, 31132 & 31133)

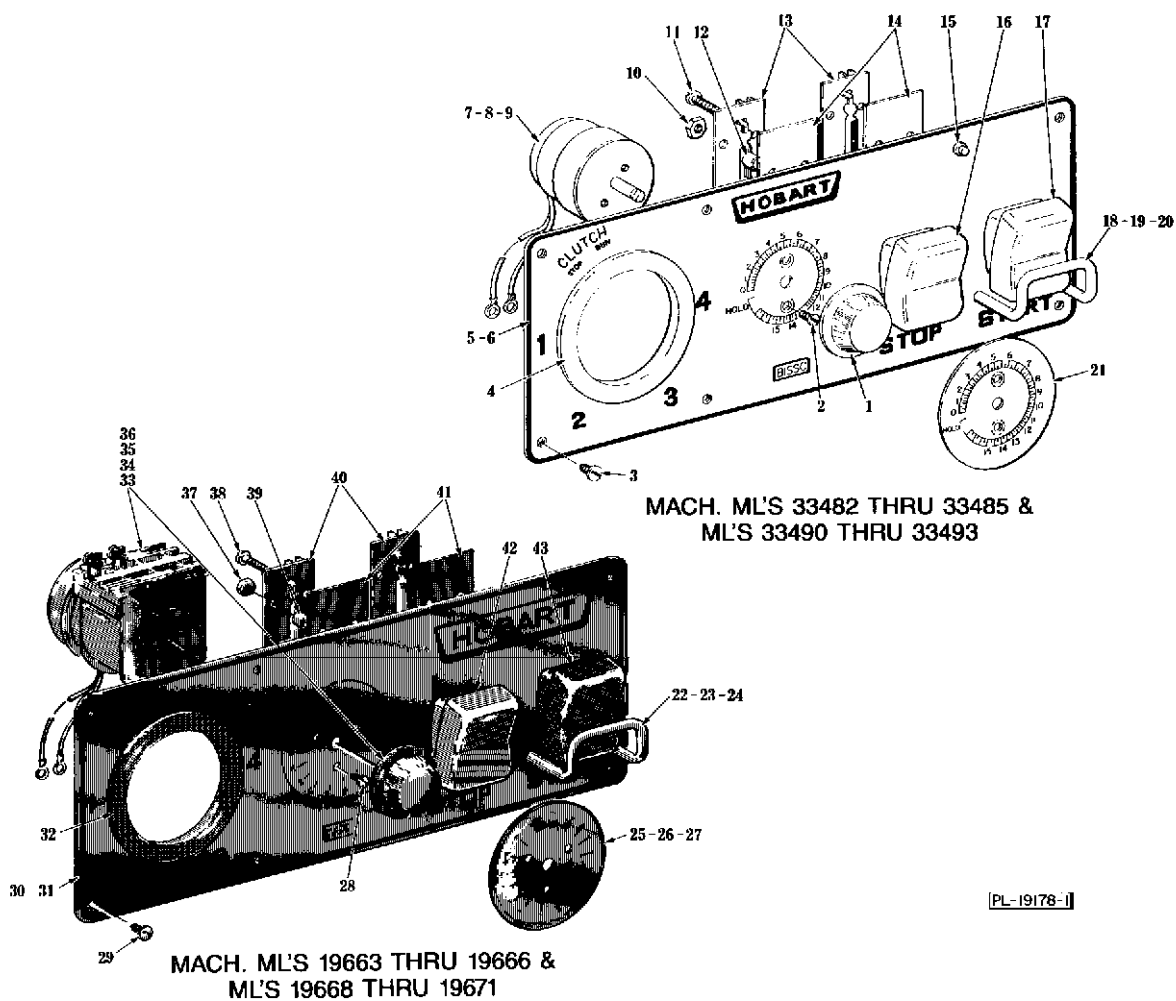
ILLUS. PL-14707	PART NO.	NAME OF PART ²⁸	AMT.
1	SC-68-14	Mach. Screw 8-32 x $\frac{3}{8}$ Trimmed Hex Hd	4
2	64462	Grommet - Gear Shift Hub	1
3	64470	Lens - Bowl Light	1
4	SC-14-45	Mach. Screw 8-32 x $\frac{3}{8}$ Flat Hd	1
5	64469	Socket - Mounting & Reflector	1
6	74541	Receptacle	1
7	87532-19	Lead - Receptacle to Controller (10" Lg.) (C-1)	1
8	87532-20	Lead - Receptacle to Controller (10" Lg.) (C-3)	1
9	BL-2-5	Light Bulb (10 W., 230 V.)	1
10	87532-17	Lead - Controller to Timer (7" Lg.) (C-5)	1
11	87532-18	Lead - Controller to Timer (7" Lg.) (C-2)	1
**12	— — —	Timer & Gasket Assy. (15 Min.)	1
**13	— — —	Timer, Dial & Gasket Assy. (18 Min.) (50 Hz.) (Incls. item 40)	1
**14	— — —	Timer, Dial & Gasket Assy. (30 Min.) (Incls. item 39)	1
**15	— — —	Timer, Dial & Gasket Assy. (60 Min.) (Incls. item 38)	1
16	87712-2-1	Starter - Magnetic (Less Elements) (200/230 V., 60 Hz., 1 Ph.)	1
17	87712-12-1	Starter - Magnetic (Less Elements) (200/230 V., 60 Hz.; 220 V., 50 Hz.) (3 Ph.)	1
18	87712-23-1	Starter - Magnetic (Less Elements) (460 V., 60 Hz.; 380 V., 50 Hz.) (3 Ph.)	1
19	*	Heater Element - Magnetic Starter	AR
20	SC-7-37	Mach. Screw 8-32 x $\frac{1}{4}$ Rd. Hd	3
21	WL-3-15	Lock Washer 8 Light	3
22	SC-7-37	Mach. Screw 8-32 x $\frac{1}{4}$ Rd. Hd	3
23	WL-3-15	Lock Washer 8 Light	3
24	64505	Plate - Controller Mounting (Use with items 16 & 17)	1
25	FE-4-21	Cover - Junction Box	1
26	FE-7-14	Bushing $\frac{3}{4}$ Conduit	1
27	FE-7-12	Lock Nut $\frac{3}{4}$	2
28	64495	Box - Junction	1
29	64494	Bushing - Conduit	1
30	62336-65	Conduit $\frac{3}{4}$ " x 20" Lg. (Non-Metallic)	1
31	62336-66	Conduit $\frac{3}{4}$ " x 8" Lg. (Non-Metallic)	1
32	122759	Button - Start/Stop	2
33	123131	Self-Tapping Screw 8-32 x $\frac{3}{8}$ Serrated Hd. "Taptite"	6
34	123119-1	Plate - Switch	1
35	102467-2	Cap - Push Button (Stop) (Red)	1
36	102467-1	Cap - Push Button (Start) (Black)	1
37	SC-10-32	Mach. Screw 8-32 x $\frac{3}{8}$ Truss Hd	3
38	79819	Dial - Timer (60 Min.)	1
39	79818	Dial - Timer (30 Min.) (Not Shown)	1
40	109594	Dial - Timer (18 Min.) (50 Hz.) (Not Shown)	1

*Give Elec. Spec. Mach. Model & Motor Type.

**Items 12, 13, 14 & 15 have been discontinued, order service kit listed below to convert to new style.

291828-1 for 50 Hz.

292165-1 for 60 Hz.



SWITCH PLATE AND TIMER UNIT

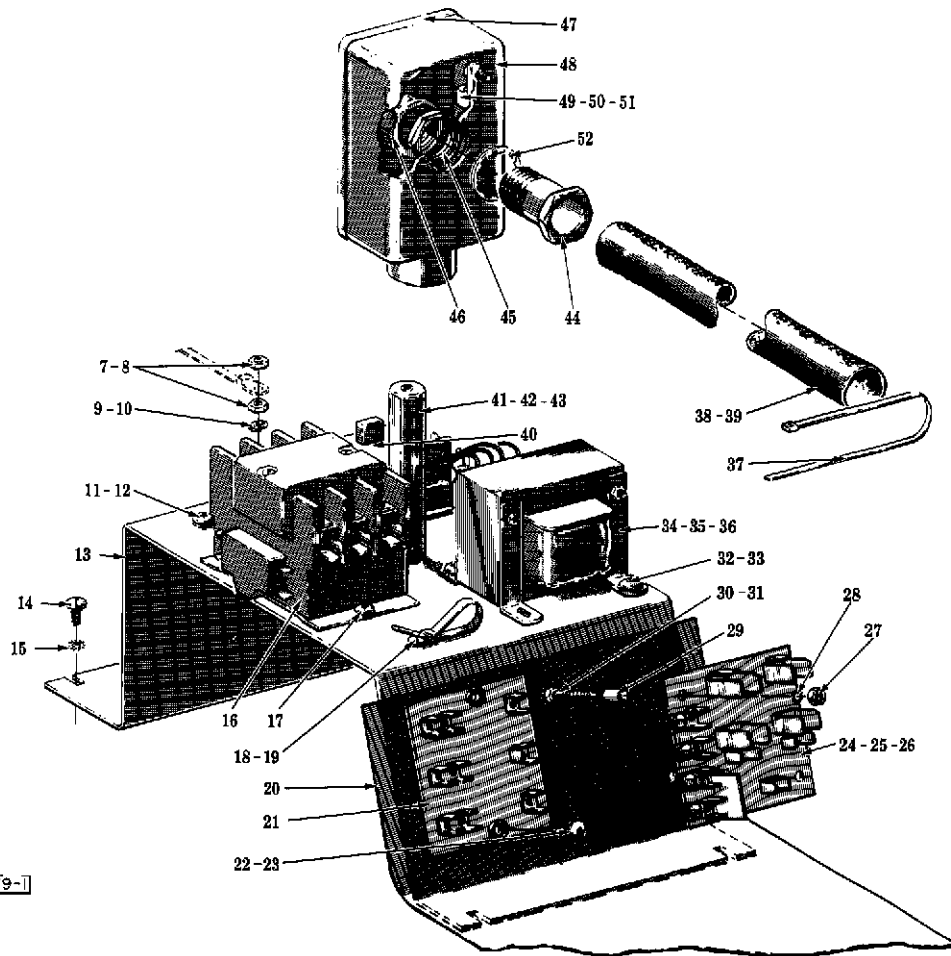
SWITCH PLATE AND TIMER UNIT

ILLUS. PL-19178-1	PART NO.	NAME OF PART ²⁸	AMT.
1	291748	Knob - Timer	1
2	SC-13-7	Mach. Screw 5-40 x 1/4 Flat Hd	2
3	123131	Screw 8-32 x 3/8 Serrated Hd	6
4	64462	Grommet - Gear Shift Hub	1
5	291731-2	Plate - Switch (Standard Mach.)	1
6	291733-2	Plate - Switch (Higher than Standard Machine)	1
7	294650-4-1	Timer & Terminal Assy. (115 V., 60 Hz.)	1
8	294650-4-3	Timer & Terminal Assy. (115 V., 50 Hz.)	1
9	291750	Insulator - Switch	1
10	NS-31-1	Full Nut 6-32 Hex Fin	4
11	SD-9-40	Self-Tapping Screw 6-32 x 3/4 Pan Hd., Type F	4
12	118349	Standoff - Reed Board	8
13	278074	Reed Mtg. Board Assy	2
14	124022	Insulator - Reed Board	2
15	294700-4-2	Pilot Light	1
16	120872-4	Switch Assy. (Stop)	1
17	120872-2	Switch Assy. (Start)	1
18	116525	Guard - Switch	1
19	123109	Screw 6-32 x 3/8 Serrated Hd	2
20	WS-2-14	Washer	2
21	291829	Dial - Timer (15 Min.)	1
22	116525	Guard - Switch	1
23	123109	Screw 6-32 x 3/8 Serrated Hd	2
24	WS-2-14	Washer	2
25	109594	Dial - Timer (18 Min.)	1
26	79818	Dial - Timer (30 Min.)	1
27	79819	Dial - Timer (60 Min.)	1
28	SC-10-32	Mach. Screw 8-32 x 3/8 Truss Hd	3
29	123131	Screw 8-32 x 3/8 Serrated Hd	6
*30	— — —	Plate Switch (Standard Machine)	1
*31	— — —	Plate Switch (Higher than Standard Machine)	1
32	64472	Grommet - Gear Shift Hub	1
*33	— — —	Timer & Gasket Assy. (15 or 18 Min.)	1
*34	— — —	Timer & Gasket Assy. (30 Min.)	1
*35	— — —	Timer & Gasket Assy. (60 Min.)	1
36	103004	Gasket - Timer Shaft	1
37	NS-31-1	Full Nut 6-32 Hex Fin	4
38	SD-9-40	Self-Tapping Screw 6-32 x 3/4 Pan Hd., Type F	4
39	118349	Stand Off - Reed Board	8
40	278074	Reed Mtg. Board Assy	2
41	124022	Insulator - Reed Board	2
42	120872-4	Switch Assy. (Stop)	1
43	120872-2	Switch Assy. (Start)	1

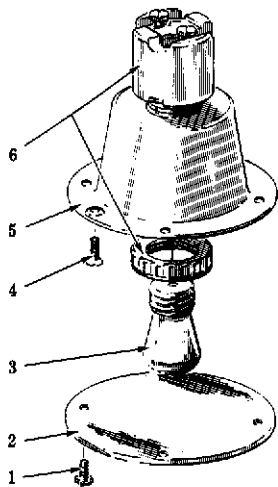
*Item 30, 31, 33 & 34 have been discontinued, order service kit listed below to convert to new style:

291828-1 M802 & V1401 Series (115 V., 60 Hz.)

291828-2 M802 & V1401 Series (115 V., 50 Hz.).



PL-19179-1

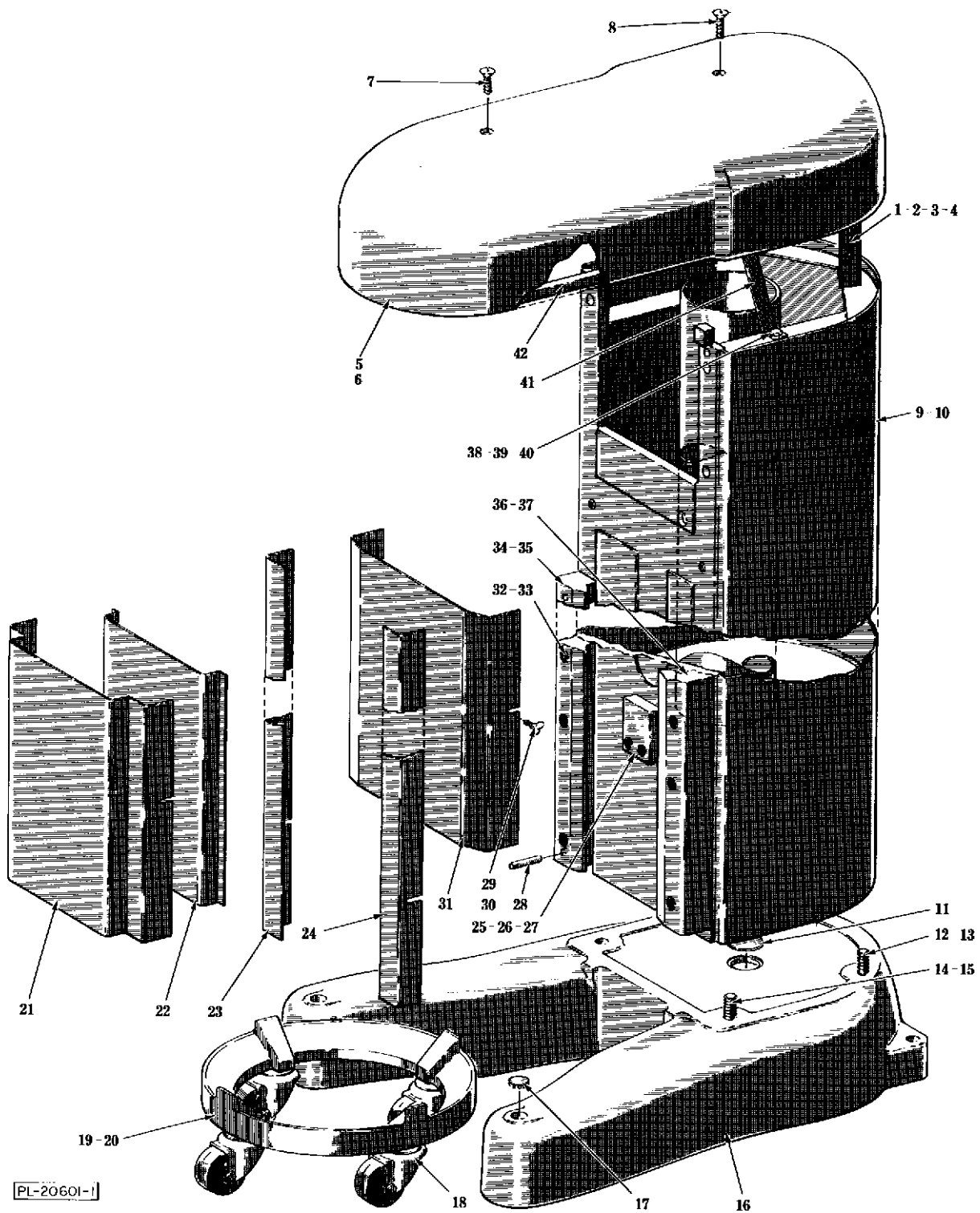


ELECTRICAL UNIT

(MACH. M.L'S 33482, 33483, 33484, 33485, 33490, 33491, 33492 & 33493)

ELECTRICAL UNIT
(MACH. ML'S 33482, 33483, 33484 33485, 33490, 33491, 33492 & 33493)

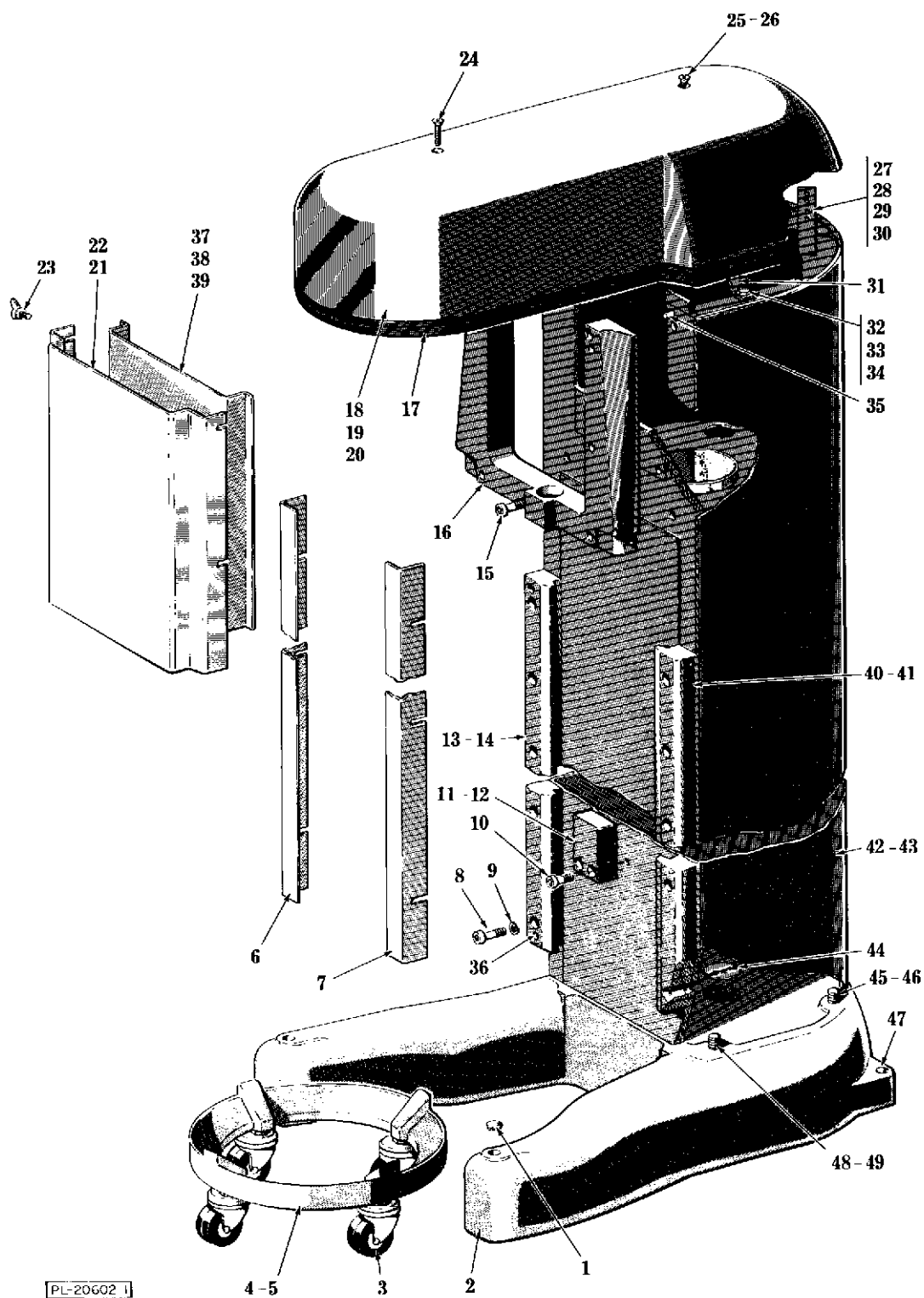
ILLUS. PL-19179-1	PART NO.	NAME OF PART ²⁸	AMT.
1	SC-68-14	Mach. Screw 8-32 x $\frac{3}{8}$ Trimmed Hex Hd	4
2	64470	Lens - Bowl Light	1
3	BL-2-29	Light Bulb (10 W., 125 V.)	1
4	SC-14-45	Mach. Screw 8-32 x $\frac{3}{8}$ Flat Hd	1
5	64469	Socket - Mounting & Reflector	1
6	74541	Receptacle	1
7	SC-9-64	Mach. Screw 6-32 x 1 Rd. Hd	4
8	NS-9-7	Mach. Nut 6-32 Hex	9
9	WL-3-9	Lock Washer 6 Medium	4
10	119994	Spacer	4
11	SD-15-20	Self-Tapping Screw 10-32 x $\frac{3}{8}$ Phil. Pan Hd., Type TT	1
12	124674	Tie - Cable	2
13	124676	Panel - Control	1
14	SD-24-1	Self-Tapping Screw 10-24 x $\frac{3}{8}$ Pan Hd., Type TT	4
15	WL-10-6	Lock Washer 10 Ext. Shakeproof	4
16	121926-2	Contactor Assy. (3 Pole)	1
17	SD-15-20	Self-Tapping Screw 10-32 x $\frac{3}{8}$ Phil. Pan Hd., Type TT	2
18	SD-15-20	Self-Tapping Screw 10-32 x $\frac{3}{8}$ Phil. Pan Hd., Type TT	1
19	124674	Tie - Cable	1
20	290376	Cover - Control	1
21	121014	Terminal Board Assy. (Use with Dual Voltage 3 Ph.)	1
22	SD-15-20	Self-Tapping Screw 10-32 x $\frac{3}{8}$ Phil. Pan Hd., Type TT	AR
23	WS-19-6	Washer	1
24	114707	Fuse Board Assy	1
25	FE-19-48	Fuse (BBS - .8 Amps.)	2
26	FE-16-29	Fuse (BBS - 1 Amp.)	2
27	NS-9-7	Mach. Nut 6-32 Hex	2
28	WL-10-6	Lock Washer 10 Ext. Shakeproof	2
29	119994	Spacer	2
30	SC-9-64	Mach. Screw 6-32 x 1 Rd. Hd	2
31	NS-9-7	Mach. Nut 6-32 Hex	2
32	SD-15-20	Self-Tapping Screw 10-32 x $\frac{3}{8}$ Pan Hd. Type TT	2
33	WL-7-12	Lock Washer 10 Ext. Shakeproof	2
34	111983-2	Power Input Board Assy. (60 Hz.) (Incls. item 36)	1
35	111983-4	Power Input Board Assy. (50 Hz.) (Incls. item 36)	1
36	FE-22-63	Fuse (AGA - 3.3 Amps.)	1
37	113703	Tie - Cable	AR
38	62336-77	Conduit - Flexible (1" Dia. x 24")	1
39	62336-78	Conduit - Flexible (1" Dia. x 12")	1
40	278328	Motor Protection Board	1
41	124655	Support - Top Cover	1
42	SC-36-14	Cap Screw $\frac{1}{4}$ -20 x $\frac{1}{2}$ Hex Hd	1
43	WL-3-38	Lock Washer $\frac{1}{4}$ Medium	1
44	64494	Bushing - Conduit	1
45	FE-7-12	Lock Nut $\frac{3}{4}$	2
46	FE-7-14	Bushing $\frac{3}{4}$ Conduit	1
47	FE-4-21	Cover - Junction Box (Incls. Fasteners)	1
48	64495	Box - Junction Box	1
49	118544-4	Lug - Solderless	1
50	SD-24-1	Self-Tapping Screw 10-24 x $\frac{3}{8}$ Pan Hd. Type TT	1
51	WL-10-6	Lock Washer 10 Ext. Shakeproof	1
52	WL-19-5	Lock Washer $1\frac{1}{8}$ Int. Shakeproof	1



**BASE AND PEDESTAL UNIT
(M802 SERIES)**

BASE AND PEDESTAL UNIT (M802 SERIES)

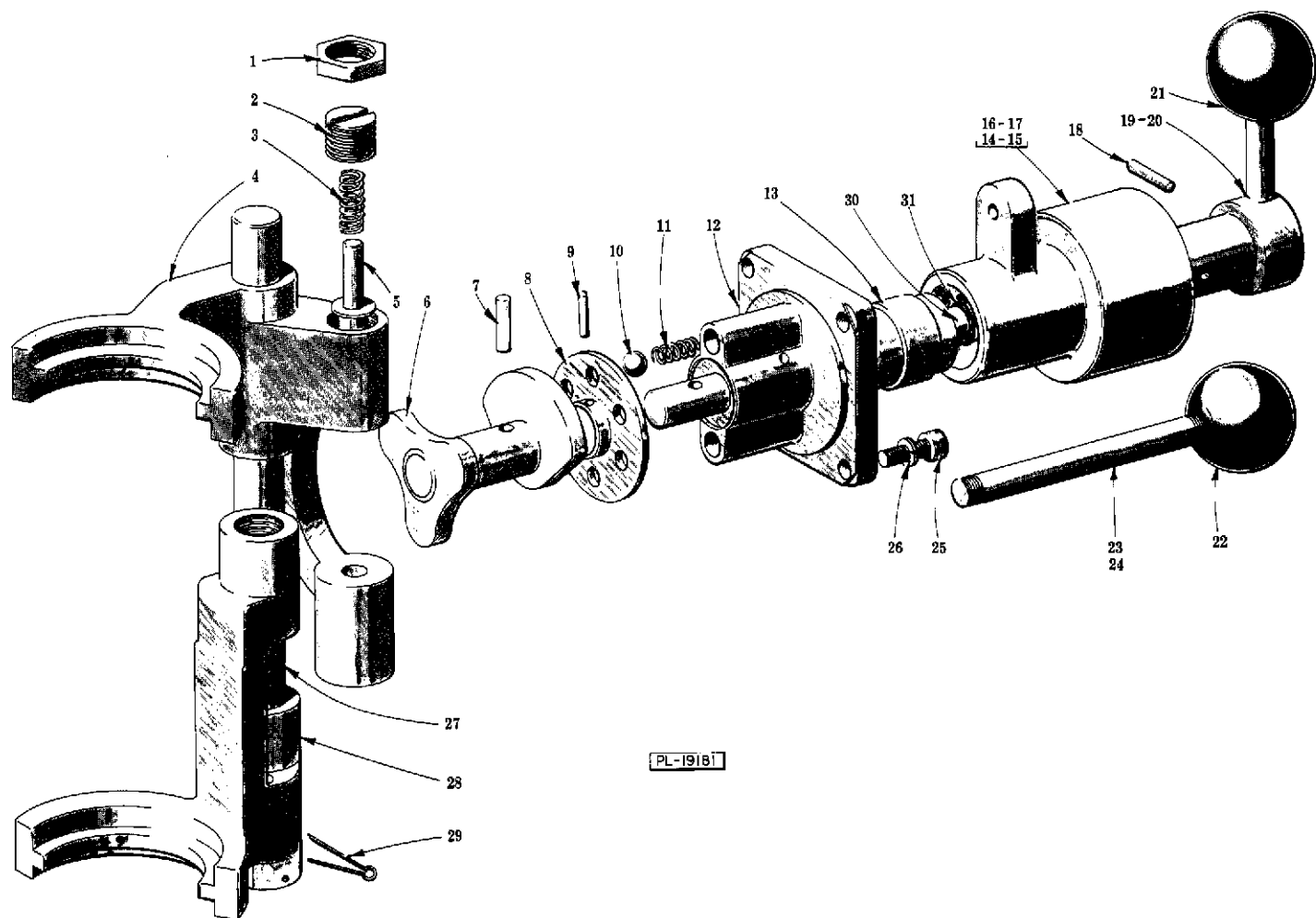
ILLUS. PL-20601-1	PART NO.	NAME OF PART ²⁸	AMT.
1	117550	Holder - Capacitor (1 Ph.)	1
2	NS-13-1	Full Nut 1/4-20 Hex Fin. (1 Ph.)	2
3	WL-3-37	Lock Washer 1/4 Medium (1 Ph.)	2
4	SC-36-4	Cap Screw 1/4-20 x 3/4 Hex Hd. (1 Ph.)	2
5	291671	Top Cover Assy. (Painted) (Incls. item 42)	1
6	64567-2	Top Cover Assy. (Chrome Plated) (Incls. item 42)	1
7	SC-15-70	Mach. Screw 1/4-20 x 1 Oval Hd	1
8	SC-15-76	Mach. Screw 1/4-20 x 1 3/4 Oval Hd	1
9	64371	Pedestal Assy. (Std.)	1
10	77490	Pedestal Assy. (Higher Than Std.)	1
11	PL-3-39	Plug 2 1/4 Expansion	1
12	SC-37-1	Cap Screw 1/2-13 x 1 1/2 Hex Hd	2
13	WL-4-12	Lock Washer 1/2 Light	2
14	SC-37-36	Cap Screw 5/8-11 x 3 1/2 Hex Hd	2
15	WL-4-18	Lock Washer 5/8 Light	2
16	64362-2	Base	1
17	72442-1	Plug - Button (Used to Plug Holes for Hold Down Bolts)	4
18	87669-1	Caster	4
19	21922-1	Bowl Truck Assy. (Painted) (Incls. item 81)	1
20	21922-3	Bowl Truck Assy. (Aluminum) (Incls. item 18)	1
21	86502	Outer Apron Assy. (Higher Than Std.)	1
22	77495	Apron - Inner (Higher Than Std.)	1
23	77497	Cover - Slideway (L.H.) (Higher Than Std.)	1
24	77496	Cover - Slideway (R.H.) (Higher Than Std.)	1
25	290407-1	Block - Stop (Std.)	1
26	290407-2	Block - Stop (Higher Than Std.)	1
27	SC-40-69	Cap Screw 1/2-20 x 2 Soc. Fil. Hd	2
28	11800-143	Dowel	2
29	70641-9	Thumb Screw (Std.)	2
30	70641-9	Thumb Screw (Higher Than Std.) (Cover)	4
31	64471	Apron (Std.)	1
32	SC-40-69	Cap Screw 1/2-20 x 2 Soc. Fil. Hd	AR
33	WL-4-13	Lock Washer 1/2 Medium	AR
34	67890	Slideway (L.H.) (Std.)	1
35	77492	Slideway (L.H.) (Higher Than Std.)	1
36	67889	Slideway (R.H.) (Std.)	1
37	77491	Slideway (R.H.) (Higher Than Std.)	1
38	SC-36-4	Cap Screw 1/4-20 x 3/4 Hex Hd. (Use on Mach. with ML-16449 & ML-18820)	2
39	WL-3-37	Lock Washer 1/4 Medium (Use on Mach. with ML-16449 & ML-18820)	2
40	NS-13-1	Full Nut 1/4-20 Hex Fin. (Use on Mach. with ML-16449 & ML-18820)	2
41	64653	Strap - Top Anchoring (Use on Mach. with ML-16449 & ML-18820)	1
42	24781-3	Seat - Top Cover Rubber	1



**BASE AND PEDESTAL UNIT
(V1401 SERIES)**

BASE AND PEDESTAL UNIT (V1401 SERIES)

ILLUS. PL-20602-1	PART NO.	NAME OF PART ^{2a}	AMT.
1	72442-1	Plug - Button (Used to plug holes for hold down bolts)	2
2	67880-2	Base	1
3	87669-1	Caster - Bowl Truck	4
4	21922-1	Bowl Truck Assy. (Painted) (Incls. item 3)	1
5	21922-3	Bowl Truck Assy. (Aluminum) (Incls. item 3)	1
6	102155	Slideway Cover Assy. (L.H.) (17" Higher than Standard Machine)	1
7	102151	Slideway Cover Assy. (R.H.) (17" Higher than Standard Machine)	1
8	SC-40-69	Cap Screw 1/2-20 x 2 Soc. Fil. Hd	AR
9	WL-4-13	Lock Washer 1/2 Medium	2
10	SC-40-69	Cap Screw 1/2-20 x 2 Soc. Fil. Hd	AR
11	290408-1	Block - Stop (Standard Machine)	1
12	290408-2	Block - Stop (17" Higher than Standard Machine) (Not Shown)	1
13	67890	Slideway (L.H.) (Standard Machine)	1
14	102144	Slideway (L.H.) (17" Higher than Standard Machine)	1
15	SC-40-45	Cap Screw 5/8-11 x 2 Soc. Fil. Hd	1
16	67923-2	Adapter - Transmission Case	1
17	24781-4	Seat - Top Cover Rubber	1
18	292015	Top Cover Assy. (Incls. item 17) (Painted)	1
19	67956-2	Top Cover Assy. (Incls. item 17) (Chrome Plated)	1
20	80029	Clip - Top Cover	4
21	67906	Apron (Standard Machine)	1
22	102147	Apron (17" Higher than Standard Machine)	1
23	70641-9	Thumb Screw 10-24	4
24	SC-15-76	Mach. Screw 1/4-20 x 1 3/4 Oval Hd	1
25	SC-16-19	Mach. 1/4-20 x 2 Oval Hd. (Use with item 31)	1
26	SC-15-70	Mach. Screw 1/4-20 x 1 Oval Hd	1
27	117550	Holder - Capacitor (1 Ph.)	1
28	SC-36-4	Cap Screw 1/4-20 x 3/4 Hex Hd. (1 Ph.)	2
29	WL-3-37	Lock Washer 1/4 Medium (1 Ph.)	2
30	NS-13-1	Full Nut 1/4-20 Hex Fin. (1 Ph.)	2
31	67909	Strap - Top Anchoring (ML-16451 & ML-18821 Only)	1
32	SC-36-4	Cap Screw 1/4-20 x 3/4 Hex Hd. (Use with item 31)	2
33	WL-3-37	Lock Washer 1/4 Medium (Use with item 31)	2
34	NS-13-1	Full Nut 1/4-20 Hex Fin. (Use with item 31)	2
35	11800-180	Dowel	2
36	11800-143	Dowel	2
37	291201	Apron - Inner (Standard Machine)	1
38	SC-10-32	Mach. Screw 8-32 x 3/8 Truss Hd	2
39	102150	Apron - Inner (17" Higher than Standard Machine)	1
40	67889	Slideway (R.H.) (Standard Machine)	1
41	102143	Slideway (R.H.) (17" Higher than Standard Machine)	1
42	67881	Pedestal Assy. (Standard Machine)	1
43	102142	Pedestal Assy. (17" Higher than Standard Machine)	1
44	PL-3-39	Plug 2 1/4 Expansion	1
45	SC-37-1	Cap Screw 1/2-13 x 1 1/2 Hex Hd	2
46	WL-4-12	Lock Washer 1/2 Light	2
47	72442-1	Plug - Button (Used to plug holes for hold down bolts)	2
48	SC-37-36	Cap Screw 5/8-11 x 3 1/2 Hex Hd	2
49	WL-4-18	Lock Washer 5/8 Light	2

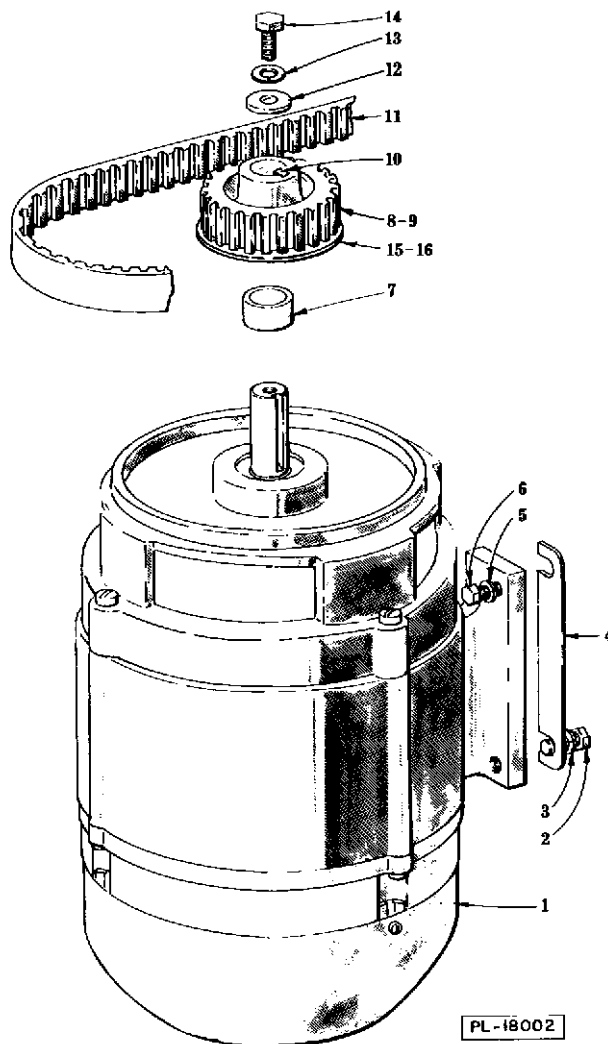


PL-19181

SHIFTING UNIT

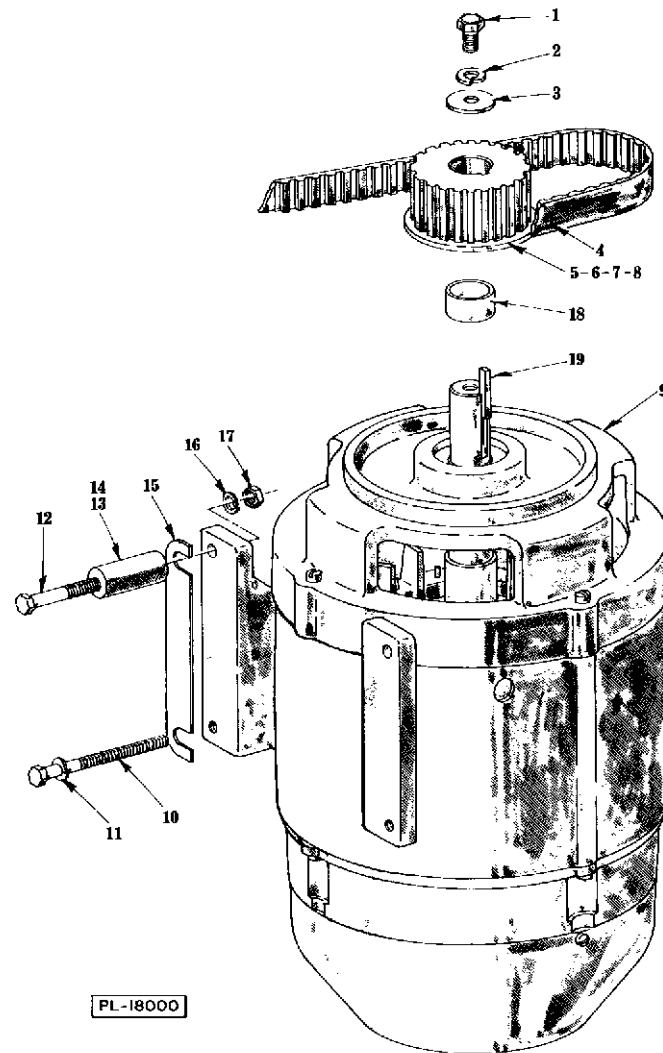
SHIFTING UNIT

ILLUS. PL-19181	PART NO.	NAME OF PART ²⁸	AMT.
1	24232	Nut - Plunger Screw	3
2	60723	Screw - Shifting Plunger	4
3	24233	Spring - Shifting Plunger	4
4	24229	Yoke - Upper Shifting	1
5	24230	Plunger - Shifting Yoke	4
6	24249	Gear Shift Cams Assy	1
7	RP-2-5	Rollpin ¼ Dia. ⅞ Lg	1
8	61922-2	Hub and Cam Assy	1
9	RP-2-10	Rollpin ⅜ Dia. x 1 Lg	1
10	BA-2-18	Ball ⅜ Dia	2
11	7009	Spring	2
12	64413	Bracket - Gear Shift	1
13	119721	Bushing - Clutch Hub	2
14	106114-1	Clutch Handle Hub Assy. (Painted) (Incls. item 13) (Use W/ML-16449, ML-16450, ML-16451 & ML-17280)	1
15	106114-2	Clutch Handle Hub Assy. (Chrome Plated) (Incls. item 13) (Use W/ML-18820, ML-18821, ML-31132 & ML-31133)	1
16	105710-1	Clutch Handle Hub Assy. (Painted) (Incls. item 13) (Use W/ML-19663, ML-19664, ML-19968, ML-19669, ML-33482, ML-33483, ML-33490 & ML-33491)	1
17	105710-2	Clutch Handle Hub Assy. (Chrome Plated) (Incls. item 13) (Use W/ML-19665, ML-19666, ML-19670, ML-19671, ML-33484, ML-33485, ML-33492 & ML-33493)	1
18	RP-2-10	Rollpin ⅜ Dia. x 1 Lg	1
19	64553-1	Gear Shift Handle & Hub Assy. (Painted)	1
20	64553-2	Gear Shift Handle & Hub Assy. (Chrome Plated)	1
21	64645	Knob (Gear Shift)	1
22	64645	Knob (Clutch)	1
23	64418-1	Handle - Clutch (Painted)	1
24	64418-2	Handle - Clutch (Chrome Plated)	1
25	SC-11-93	Mach. Screw ⅝-18 x ¾ Fil. Hd	4
26	WL-3-43	Lock Washer ⅝ Light	4
27	64830	Shaft - Shifter	1
28	24228	Yoke - Lower Shifting	1
29	PC-3-24	Cotter Pin ⅜ x 1½	1
30	64417	Shaft - Gear Shift	1
31	67500-6	"O" Ring	1



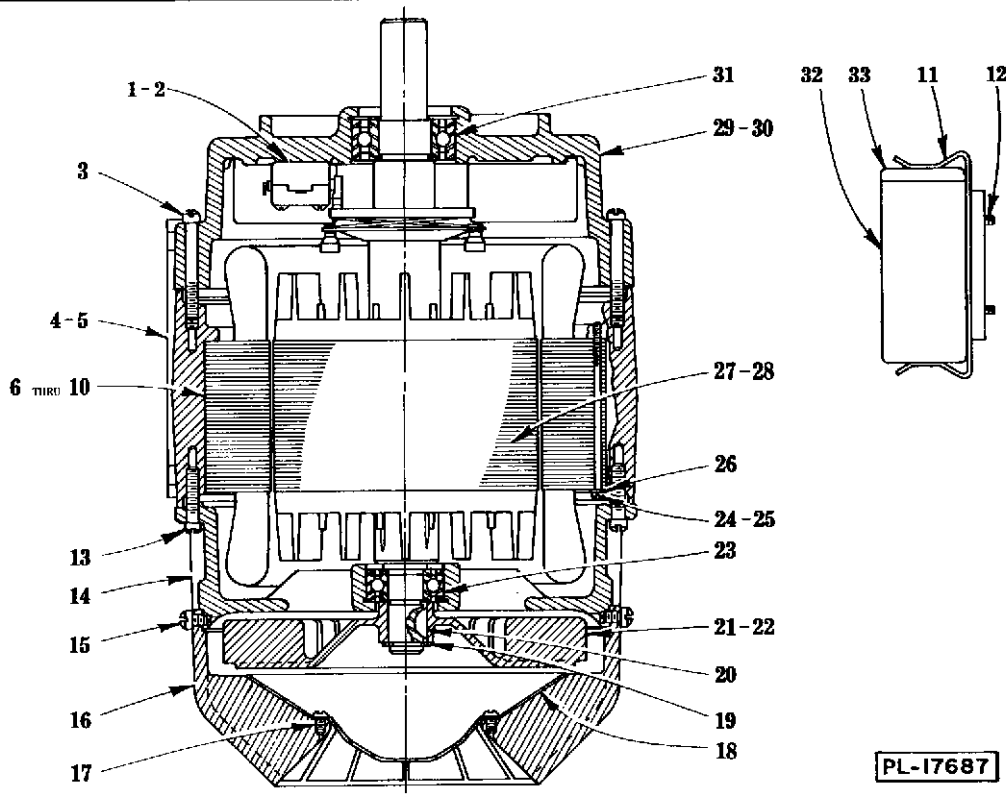
**MOTOR UNIT
(M802 SERIES)**

ILLUS. PL-18002	PART NO.	NAME OF PART ²⁸	AMT.
1	ML-40508	Motor (Give Elec. Spec.)	1
2	SC-36-60	Cap Screw $\frac{3}{8}$ -16 x $1\frac{3}{4}$ Hex Hd	2
3	WL-4-2	Lock Washer $\frac{3}{8}$ Light	2
4	9007	Shim - Motor	AR
5	WL-4-2	Lock Washer $\frac{3}{8}$ Light	2
6	SC-36-57	Cap Screw $\frac{3}{8}$ -16 x $1\frac{1}{4}$ Hex Hd	3
7	118816	Spacer	1
8	120676	Drive Gear (Flexa-Gear) (24T) (60 Hz.)	1
9	120677	Drive Gear (Flexa-Gear) (27T) (50 Hz.)	1
10	109070-19	Key - .250" x .250" x 1.500"	1
11	65107	Flexa-Gear	1
12	WS-18-41	Washer	1
13	WL-4-2	Lock Washer $\frac{3}{8}$ Light	1
14	SC-36-52	Cap Screw $\frac{3}{8}$ -16 x $\frac{3}{4}$ Hex Hd	1
15	120680	Flange - Pulley (60 Hz.)	1
16	120681	Flange - Pulley (50 Hz.)	1



MOTOR UNIT (V1401 SERIES)

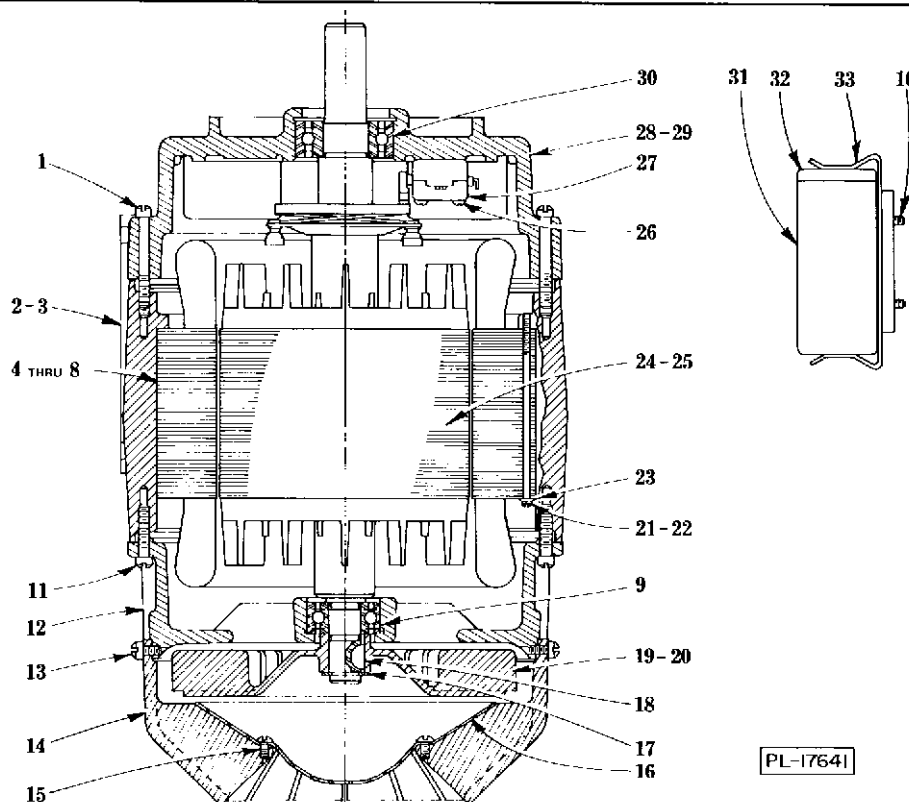
ILLUS. PL-18000	PART NO.	NAME OF PART ²⁸	AMT.
1	SC-36-52	Cap Screw $\frac{3}{8}$ -16 x $\frac{3}{4}$ Hex Hd	1
2	WL-4-2	Lock Washer $\frac{3}{8}$ Light	1
3	WS-18-41	Washer	1
4	68043	Flexa-Gear	1
5	120678	Drive Gear (Flexa-Gear) (20T) (60 Hz.)	1
6	120679	Drive Gear (Flexa-Gear) (23T) (50 Hz.)	1
7	120682	Flange - Pulley (60 Hz.)	1
8	120680	Flange - Pulley (50 Hz.)	1
9	ML-40507	Motor (Give Elec. Spec.)	1
10	SC-62-9	Cap Screw $\frac{3}{8}$ -16 x 4 Hex Hd	2
11	WL-4-2	Lock Washer $\frac{3}{8}$ Light	2
12	SC-62-10	Cap Screw $\frac{3}{8}$ -16 x $3\frac{3}{4}$ Hex Hd	2
13	67912-1	Spacer - Motor (60 Hz.)	4
14	67912-2	Spacer - Motor (50 Hz.)	4
15	9007	Shim - Motor	AR
16	WL-4-2	Lock Washer $\frac{3}{8}$ Light	2
17	NS-13-22	Full Nut $\frac{3}{8}$ -16 Hex Fin	2
18	118816	Spacer	1
19	109070-19	Key .250" x .250" x 1.500"	1



MOTOR PARTS (M802 SERIES)

ILLUS. PL-17687	PART NO.	NAME OF PART ²⁸	AMT.
1	SC-9-85	Mach. Screw 6-32 x 1 1/4 Rd. Hd. (1 Ph.)	4
2	117548	Switch - Starting (Stationary Part) (1 Ph.)	1
3	SC-38-55	Cap Screw 5/16-18 x 2 1/4 Fil. Hd	4
4	294383	Field Ring	1
5	6651	Bushing - Insulating	1
6	65477-152-1	Stator Assy. (200 V., 60 Hz., 1 Ph.)	1
7	65477-152-2	Stator Assy. (230 V., 60 Hz., 1 Ph.)	1
8	65478-154-1	Stator Assy. (200 V., 60 Hz., 3 Ph.)	1
*9	65478-155-1	Stator Assy. (230/460 V., 60 Hz., 3 Ph.)	1
*10	65478-156-1	Stator Assy. (220/380/415 V., 50 Hz., 3 Ph.)	1
11	66621-2	Bracket - Capacitor (1 Ph.)	2
12	SD-29-6	Self-Tapping Screw 10-24 x 1/2 Phil. Flat Hd., Type F (1 Ph.)	4
13	SC-11-98	Mach. Screw 5/16-18 x 1 1/4 Fil. Hd	4
14	64372	Bracket - Bearing (Fan End)	1
15	SC-12-45	Mach. Screw 1/4-20 x 3/8 Fil. Hd	2
16	64379	Housing - Blower	1
17	SC-8-9	Mach. Screw 10-24 x 3/8 Rd. Hd	4
18	64501	Cone - Blower	1
19	RR-4-6	Retaining Ring	1
20	KW-3-10	Key - 606 Woodruff	1
21	275183	Fan	1
22	SC-47-12	Set Screw 1/4-20 x 3/8 Soc. Hdls., Kn. Cup Pt	2
23	BB-16-37	Ball Bearing - NTN #63204LL	1
24	SC-12-62	Mach. Screw 10-32 x 4 Fil. Hd. (1 Ph.)	8
25	SC-8-31	Mach. Screw 10-32 x 3 1/2 Rd. Hd. (3 Ph.)	8
26	WS-2-15	Washer	8
27	22275-219	Rotor Assy. (1 Ph.)	1
28	15747-292	Rotor Assy. (3 Ph.)	1
29	117547-2	Bracket - Bearing (Pulley End) (1 Ph.)	1
30	117547-1	Bracket - Bearing (Pulley End) (3 Ph.)	1
31	BB-17-34	Ball Bearing - Fafnir #W206KLL	1
32	70487-9	Capacitor (1 Ph.)	2
33	70486-3	End Cap - Capacitor (1 Ph.)	2
	68007	Blower Housing & Cone Assy. (Incls. items 16, 17 & 18)	1

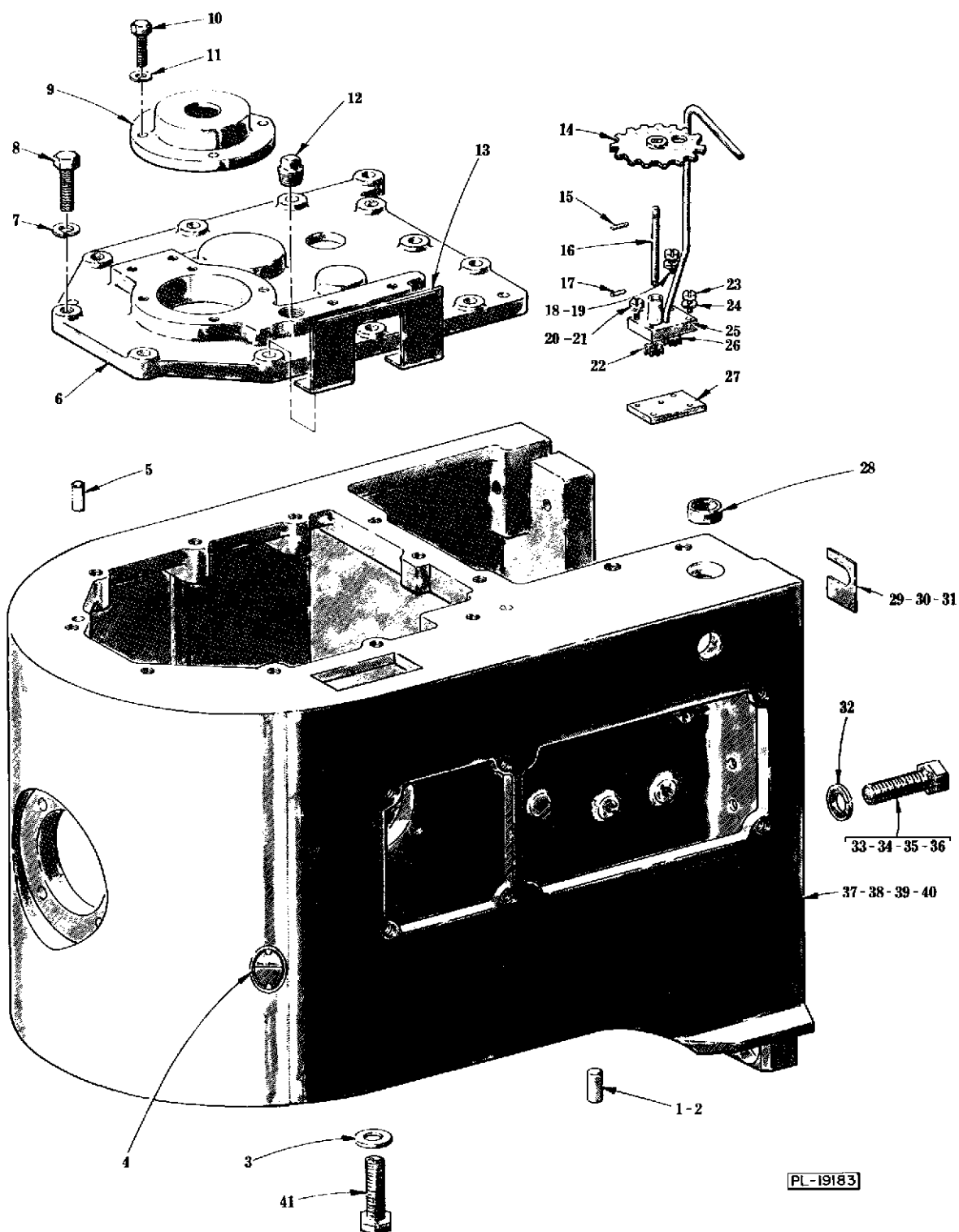
*To Replace a Single Voltage Stator (3 Leads) Order the Appropriate Dual Voltage Stator plus 294127 Service Kit.



MOTOR PARTS (V1401 SERIES)

ILLUS. PL-17641	PART NO.	NAME OF PART ²⁸	AMT.
1	SC-38-55	Cap Screw $\frac{5}{8}$ -18 x 2 $\frac{1}{4}$ Fil. Hd	4
2	294384	Field Ring	1
3	6651	Bushing - Insulating (Not Shown)	1
4	65477-151-1	Stator Assy. (200 V., 60 Hz., 1 Ph.)	1
5	65477-151-2	Stator Assy. (230 V., 60 Hz., 1 Ph.)	1
6	65478-151-1	Stator Assy. (200 V., 60 Hz., 3 Ph.)	1
*7	65478-152-1	Stator Assy. (230/460 V., 60 Hz., 3 Ph.)	1
*8	65478-153-1	Stator Assy. (220/380/415 V., 50 Hz., 3 Ph.)	1
9	BB-16-37	Ball Bearing - Fafnir #W204 PPCI	1
10	SD-29-6	Self-Tapping Screw 10-24 x $\frac{1}{2}$ Flat Hd., Type F (1 Ph.)	4
11	SC-11-98	Mach. Screw $\frac{5}{16}$ -18 x 1 $\frac{1}{4}$ Fil. Hd	4
12	64372	Bracket - Bearing (Fan End)	1
13	SC-12-45	Mach. Screw $\frac{1}{4}$ -20 x $\frac{3}{8}$ Fil. Hd	2
14	64379	Housing - Blower	1
15	SC-8-9	Mach. Screw 10-24 x $\frac{3}{8}$ Rd. Hd	4
16	64501	Cone - Blower	1
17	RR-4-6	Retaining Ring	1
18	KW-3-10	Key #606 Woodruff	1
19	275183	Fan - Ventilating	1
20	SC-47-12	Set Screw $\frac{1}{4}$ -20 x $\frac{3}{8}$ Hdls., Kn. Cup Pt	2
21	SC-11-56	Mach. Screw 10-32 x 4 Fil. Hd. (1 Ph.)	8
22	SC-12-62	Mach. Screw 10-32 x 4 Fil. Hd. (3 Ph.)	8
23	WS-2-15	Washer	8
24	22275-220	Rotor Assy. (1 Ph.)	1
25	15747-293	Rotor Assy. (3 Ph.)	1
26	SC-9-85	Mach. Screw 6-32 x 1 $\frac{1}{4}$ Rd. Hd. (1 Ph.)	4
27	117548	Switch - Starting (Stationary Part) (1 Ph.)	1
28	117547-2	Bracket - Bearing (Pulley End) (1 Ph.)	1
29	117547-1	Bracket - Bearing (Pulley End) (3 Ph.)	1
30	BB-17-34	Ball Bearing - Fafnir #W206KLL	1
31	70487-17	Capacitor (1 Ph.)	2
32	70486-4	End Cap - Capacitor (1 Ph.)	2
33	66621-2	Bracket - Capacitor (1 Ph.)	2
	68007	Blower Housing & Cone Assy. (Incls. items 14, 15 & 16)	1

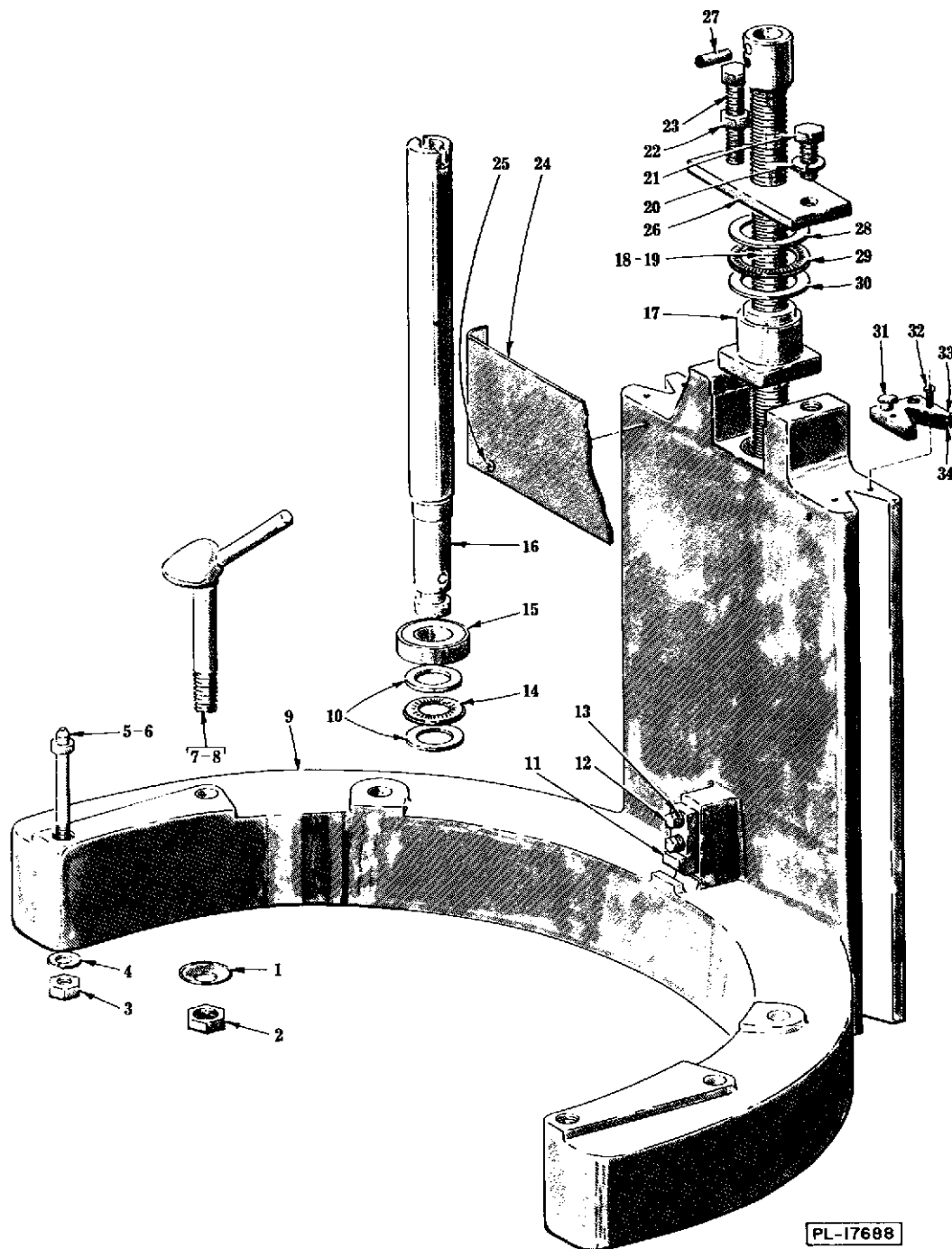
*To replace a Single Voltage Stator (3 Leads), Order the Appropriate Dual Voltage Stator plus 294127 Service Kit.



TRANSMISSION CASE UNIT

TRANSMISSION CASE UNIT

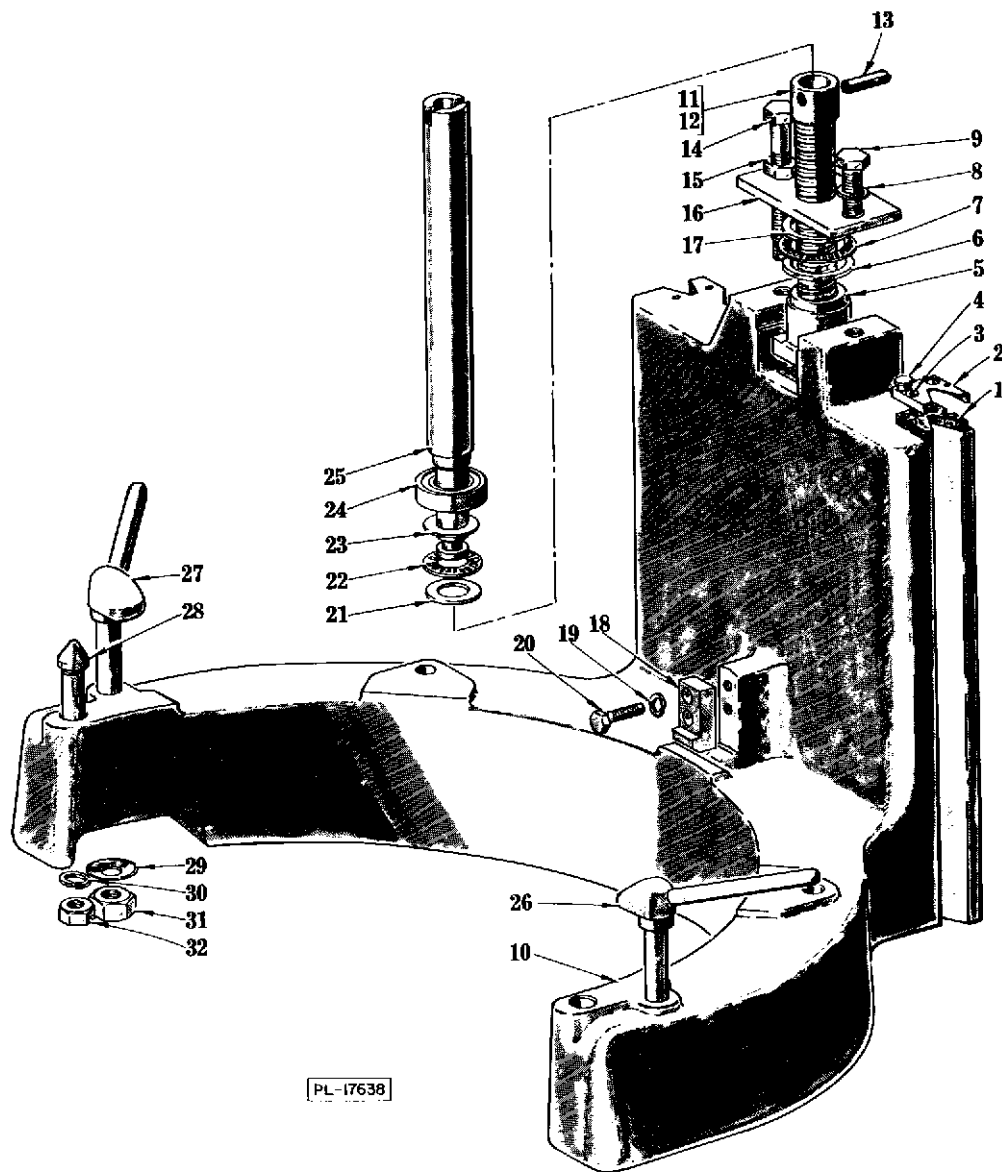
ILLUS. PL-19183	PART NO.	NAME OF PART ²⁸	AMT.
1	11800-180	Dowel (M802 Series)	2
2	11800-142	Dowel (V1401 Series)	2
3	WS-21-21	Washer	1
4	22793	Gauge - Oil Level	1
5	11800-224	Dowel	2
6	106868	Cover - Transmission Case	1
7	WL-4-2	Lock Washer $\frac{3}{8}$ Light	11
8	SC-62-41	Cap Screw $\frac{5}{8}$ -16 x $1\frac{1}{2}$ Hex Hd	11
9	106867	Retainer - Upper Bearing	1
10	SC-36-27	Cap Screw $\frac{5}{16}$ -18 x 1 Hex Hd	4
11	WL-3-48	Lock Washer $\frac{5}{16}$ High Collar	4
12	FP-28-13	Plug $\frac{1}{2}$ Sq. Hd. Pipe	1
13	73488	Stop - Clutch Arm	1
14	64554	Drive Gear Assy. (25T)	1
15	RP-2-8	Rollpin $\frac{5}{64}$ Dia. x $1\frac{1}{16}$ Lg	1
16	*	Shaft	1
17	538772	Dowel $\frac{3}{32}$ Dia. x $1\frac{1}{32}$ Lg	1
18	SC-11-10	Mach. Screw 8-32 x $\frac{5}{8}$ Fil. Hd	1
19	WL-3-15	Lock Washer 8 Light	1
20	SC-12-47	Mach. Screw 10-32 x $\frac{5}{8}$ Fil. Hd	1
21	WL-3-22	Lock Washer 10 Light	1
22	*	Gear - Oil Pump (15T) (Drive) (Slotted)	1
23	SC-12-48	Mach. Screw 10-32 x $\frac{7}{8}$ Fil. Hd	2
24	WL-3-22	Lock Washer 10 Light	2
25	123680	Housing & Tube Assy	1
26	290277	Gear - Oil Pump (15T)	1
27	64488	Plate - Oil Pump Bottom	1
28	6651	Bushing - Insulating	3
29	72992-1	Shim - Trans. Case (.010" Thk.)	AR
30	72992-2	Shim - Trans. Case (.018" Thk.)	AR
31	72992-3	Shim - Trans. Case (.036" Thk.)	AR
32	WL-4-19	Lock Washer $\frac{5}{8}$ Medium	5
33	SC-37-98	Cap Screw $\frac{5}{8}$ -11 x $1\frac{3}{4}$ Hex Hd. (M802 Series)	3
34	SC-37-93	Cap Screw $\frac{5}{8}$ -11 x 2 Hex Hd. (M802 Series)	2
35	SC-62-16	Cap Screw $\frac{5}{8}$ -11 x $3\frac{3}{4}$ Hex Hd. (V1401 Series)	3
36	SC-62-17	Cap Screw $\frac{5}{8}$ -11 x $3\frac{1}{2}$ Hex Hd. (V1401 Series)	2
37	74197-5	Case - Transmission (Painted) (M802 Series)	1
38	291708-2	Case - Transmission (Aluminum) (M802 Series)	1
39	74198-4	Case - Transmission (Painted) (V1401 Series)	1
40	291709-2	Case - Transmission (Aluminum) (V1401)	1
41	SC-62-60	Cap Screw $\frac{1}{2}$ -20 x 1 Hex Hd	1
	290231	Transmission Oil Pump Assy. (Incls. items 14 thru 22, 25, 26 & 27)	1
	*186273-2	Oil Pump Service Kit (Incls. items 16, 17 & 22)	1



**BOWL SUPPORT UNIT
(M802 SERIES)**

BOWL SUPPORT UNIT (M802 SERIES)

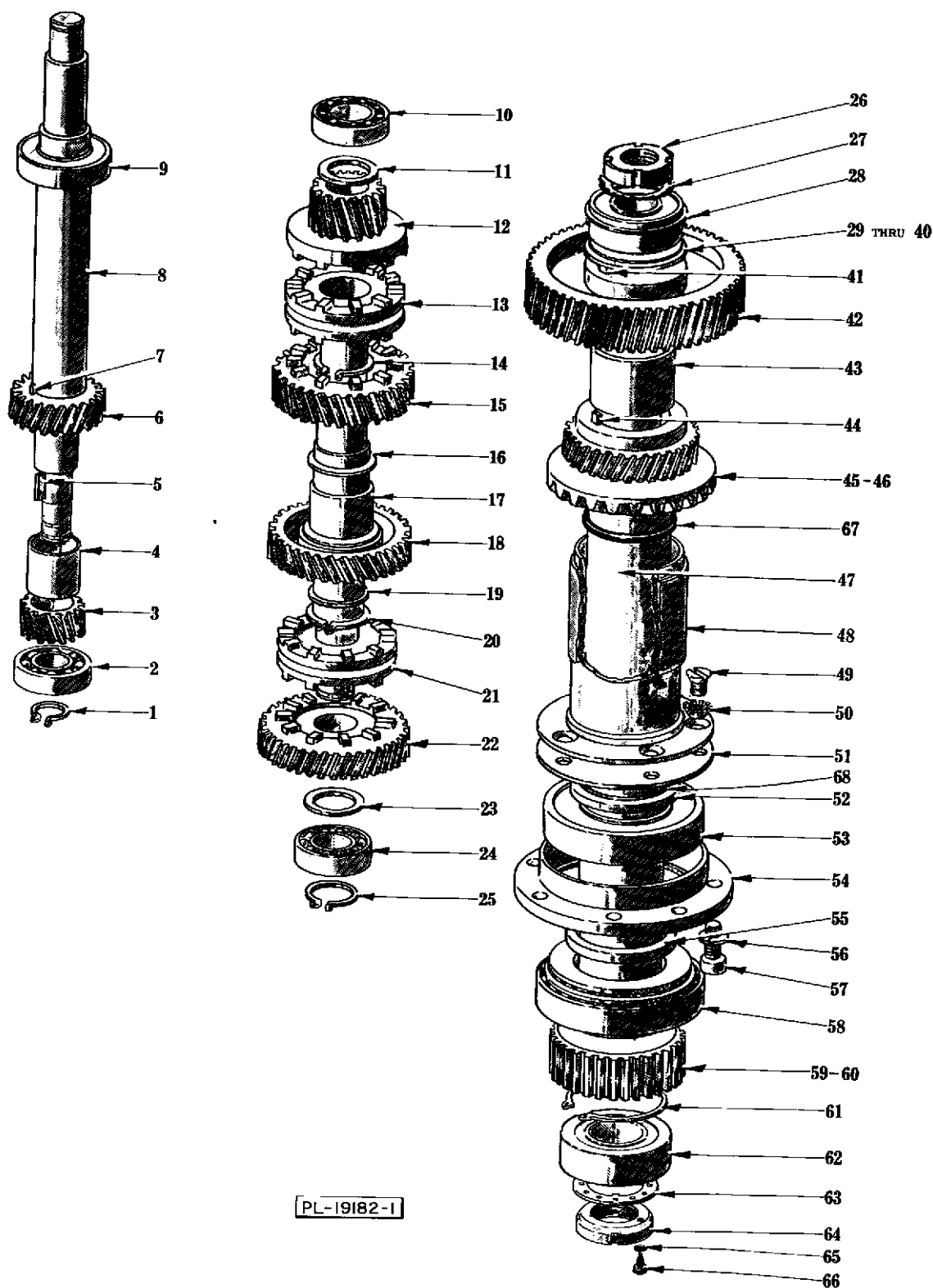
ILLUS. PL-17688	PART NO.	NAME OF PART ²⁸	AMT.
1	64636	Washer - Bowl Clamp Spring	2
2	NS-46-18	Lock Nut $\frac{5}{8}$ -11 Hex "Nylok"	2
3	NS-15-30	Full Nut $\frac{1}{2}$ -13 Hex Fin	2
4	WL-4-12	Lock Washer $\frac{1}{2}$ Light	2
5	20979-1	Stud - Bowl Locating	2
6	WS-8-2	Washer - Shim	AR
7	65922-14	Bowl Clamp Assy. (R.H.) (Not Shown)	1
8	65922-15	Bowl Clamp Assy. (L.H.)	1
9	122929-2	Support - Bowl	1
10	64558	Washer - Trust	2
11	64394	Retainer - Bowl	1
12	SC-36-27	Cap Screw $\frac{5}{16}$ -18 x 1 Hex Hd	2
13	WL-3-44	Lock Washer $\frac{5}{16}$ Medium	2
14	BN-2-18	Thrust Bearing - Needle	1
15	BB-15-8	Ball Bearing - M.R.C. #105 KS-ZZ	1
16	64389	Extension - Lift Screw	1
17	68322	Nut - Bowl Lift	1
18	290367-1	Screw - Bowl Lift (Std.)	1
19	290367-2	Screw - Bowl Lift (Higher Than Standard)	1
20	WL-4-13	Lock Washer $\frac{1}{2}$ Medium	1
21	SC-36-98	Cap Screw $\frac{1}{2}$ -13 x $1\frac{1}{4}$ Hex Hd	1
22	NS-13-30	Full Nut $\frac{1}{2}$ -13 Hex Fin	1
23	64826	Stop Screw - Bowl Yoke	1
24	291195	Apron - Inner (Std.)	1
25	SC-10-32	Mach. Screw 8-32 x $\frac{3}{8}$ Truss Hd	2
26	64392	Retainer - Nut	1
27	PS-4-21	Spirol Pin $\frac{3}{8}$ Dia. x $1\frac{1}{2}$ Lg	1
28	68321	Washer - Lift Screw Thrust	1
29	BN-2-11	Needle Bearing - Thrust	1
30	68321	Washer - Lift Screw Thrust	1
31	OG-3-23	Oiler	2
32	SC-7-44	Mach. Screw 8-32 x $\frac{5}{8}$ Rd. Hd	4
33	65682	Retainer - Wiper	2
34	65683	Wiper - Felt	2



**BOWL SUPPORT UNIT
(V1401 SERIES)**

BOWL SUPPORT UNIT (V1401 SERIES)

ILLUS. PL-17638	PART NO.	NAME OF PART ²⁸	AMT.
1	65683	Wiper - Felt	2
2	65682	Retainer - Wiper	2
3	SC-7-44	Mach. Screw 8-32 x 5/8 Rd. Hd	4
4	OG-3-23	Oiler	2
5	68322	Nut - Bowl Lift	1
6	68321	Washer - Lift Screw Thrust	1
7	BN-2-11	Thrust Bearing - Needle	1
8	WL-4-13	Lock Washer 1/2 Medium	1
9	SC-36-98	Cap Screw 1/2-13 x 1 1/4 Hex Hd	1
10	122930-2	Support - Bowl	1
11	290367-3	Bowl Lift Screw Assy. (Standard Machine)	1
12	290367-4	Bowl Lift Screw Assy. (17" Higher than Standard Machine)	1
13	PS-4-21	Spirol Pin 3/8 Dia. x 1 1/2 Lg	1
14	68443	Stop Screw - Bowl Yoke	1
15	NS-13-30	Full Nut 1/2-13 Hex Fin	1
16	67955	Retainer - Nut	1
17	68321	Washer - Lift Screw Thrust	1
18	64394	Retainer - Bowl	1
19	WL-3-44	Lock Washer 5/16 Medium	2
20	SC-36-27	Cap Screw 5/16-18 x 1 Hex Hd	2
21	64558	Washer - Thrust	1
22	BN-2-18	Thrust Bearing - Needle	1
23	64558	Washer - Thrust	1
24	BB-17-39	Ball Bearing - MRC #205-SZZ	1
25	64389	Extension - Lift Screw	1
26	65922-14	Bowl Clamp Assy. (R.H.)	1
27	65922-15	Bowl Clamp Assy. (L.H.)	1
28	19195-1	Stud - Bowl Locating	2
29	64636	Washer - Bowl Clamp Spring	2
30	WL-4-12	Lock Washer 1/2 Light	2
31	NS-46-18	Lock Nut 5/8-11 Hex "Nylok"	2
32	NS-13-30	Full Nut 1/2-13 Hex Fin	2



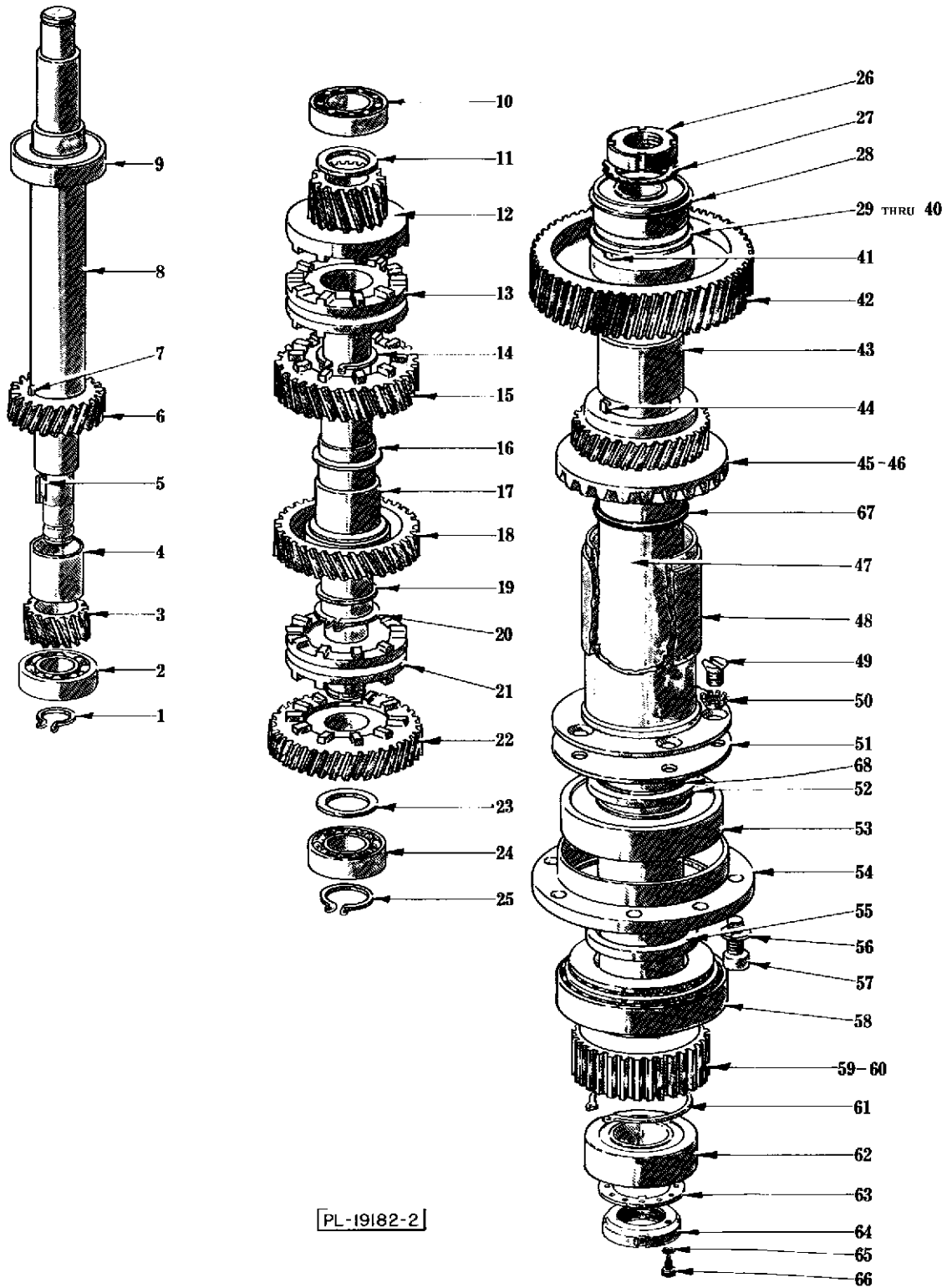
PL-19182-1

**TRANSMISSION GEAR UNIT
(M802 SERIES)**

TRANSMISSION GEAR UNIT (M802 SERIES)

ILLUS. PL-19182-1	PART NO.	NAME OF PART ²⁸	AMT.
1	RR-4-7	Retaining Ring	1
2	BB-6-1	Ball Bearing - N.D. #3304	1
3	121382	Gear - Main Drive Shaft Lower (17T)	1
4	24206	Spacer - Worm Gear	1
5	120937	Key - Special	1
6	24207	Gear - Main Drive Shaft Upper (25T)	1
7	64670	Key - Special	1
8	74221	Shaft - Main Drive	1
9	BB-7-46	Ball Bearing - N.D. #7506	1
10	BB-18-33	Ball Bearing - Fafnir #205K	1
11	24210	Spacer - Clutch Shaft	1
12	24545	Upper Clutch Upper Gear Assy. (17T)	1
13	24213	Clutch - Shifting	1
14	RR-4-13	Retaining Ring	1
15	64698	Upper Clutch Lower Gear Assy. (35T)	1
16	24216	Washer - Clutch Shaft	1
17	24209	Shaft - Clutch	1
18	24538	Lower Clutch Upper Gear Assy. (41T)	1
19	60767	Washer - Clutch Shaft	1
20	RR-5-14	Retaining Ring	1
21	24213	Clutch - Shifting	1
22	24539	Lower Clutch Lower Gear Assy. (49T)	1
23	74222	Spacer - Clutch Shaft (Lower)	1
24	BB-18-21	Ball Bearing - Fafnir #305KD	1
25	RR-5-4	Retaining Ring	1
26	NS-34-8	Lock Nut - N.D. #N-07	1
27	WL-17-9	Lock Washer - TW107	1
28	BB-9-13	Ball Bearing - MRC-5207KFFG	1
29	106888-1	Shim - Planetary Shaft (.141" Thk.)	AR
30	106888-2	Shim - Planetary Shaft (.144" Thk.)	AR
31	106888-3	Shim - Planetary Shaft (.147" Thk.)	AR
32	106888-4	Shim - Planetary Shaft (.150" Thk.)	AR
33	106888-5	Shim - Planetary Shaft (.153" Thk.)	AR
34	106888-6	Shim - Planetary Shaft (.156" Thk.)	AR
35	106888-7	Shim - Planetary Shaft (.159" Thk.)	AR
36	106888-8	Shim - Planetary Shaft (.162" Thk.)	AR
37	106888-9	Shim - Planetary Shaft (.165" Thk.)	AR
38	106888-10	Shim - Planetary Shaft (.168" Thk.)	AR
39	106888-11	Shim - Planetary Shaft (.171" Thk.)	AR
40	106888-12	Shim - Planetary Shaft (.174" Thk.)	AR
41	12430-210	Key	1
42	24225	Gear - Upper Planetary Shaft (53T)	1
43	64710	Spacer - Planetary Shaft	1
44	12430-211	Key	1
45	64421	Gear - Cluster (33T) & (25T Bevel) (Use with Attachment Hub)	1
46	291603-2	Gear (33T) (Use W/O Attachment Hub)	1
47	106889	Shaft - Planetary	1
48	64427	Chimney & Flange Assy	1
49	SC-14-75	Mach. Screw 1/4-20 x 7/16 Flat Hd	5
50	WL-9-8	Lock Washer 1/4 Csk. Ext. Shakeproof	5
51	64623	Gasket - Chimney	AR
52	64467	Spacer - Lower Bearing Upper	1
53	BB-7-7	Ball Bearing - MRC #211 S-ZZ	1
54	64468	Carrier - Lower Bearing	1
55	64468	Spacer - Lower Bearing Lower	1
56	120288	Lock Washer - Special	6
57	SC-40-14	Cap Screw 5/16-18 x 3/4 Soc. Fil. Hd	6
58	BR-2-14	Roller Bearing - Cup & Cone Assy	1
59	64386	Sun Gear (23T)	1
60	12430-210	Key - Sun Gear	1
61	RR-4-14	Retaining Ring	1
62	BR-2-15	Roller Bearing - Cup & Cone Assy	1
63	64982	Washer - Tongue	1
64	65275	Lock Nut - Special Bearing	1
65	WL-3-15	Lock Washer 8 Light	1
66	65277	Cap Screw - Special	1
67	67500-22	"O" Ring	1
68	67500-102	"O" Ring	1

*When ordering for mixer with serial number prior to 1848334, Reference T.S.B. 352.

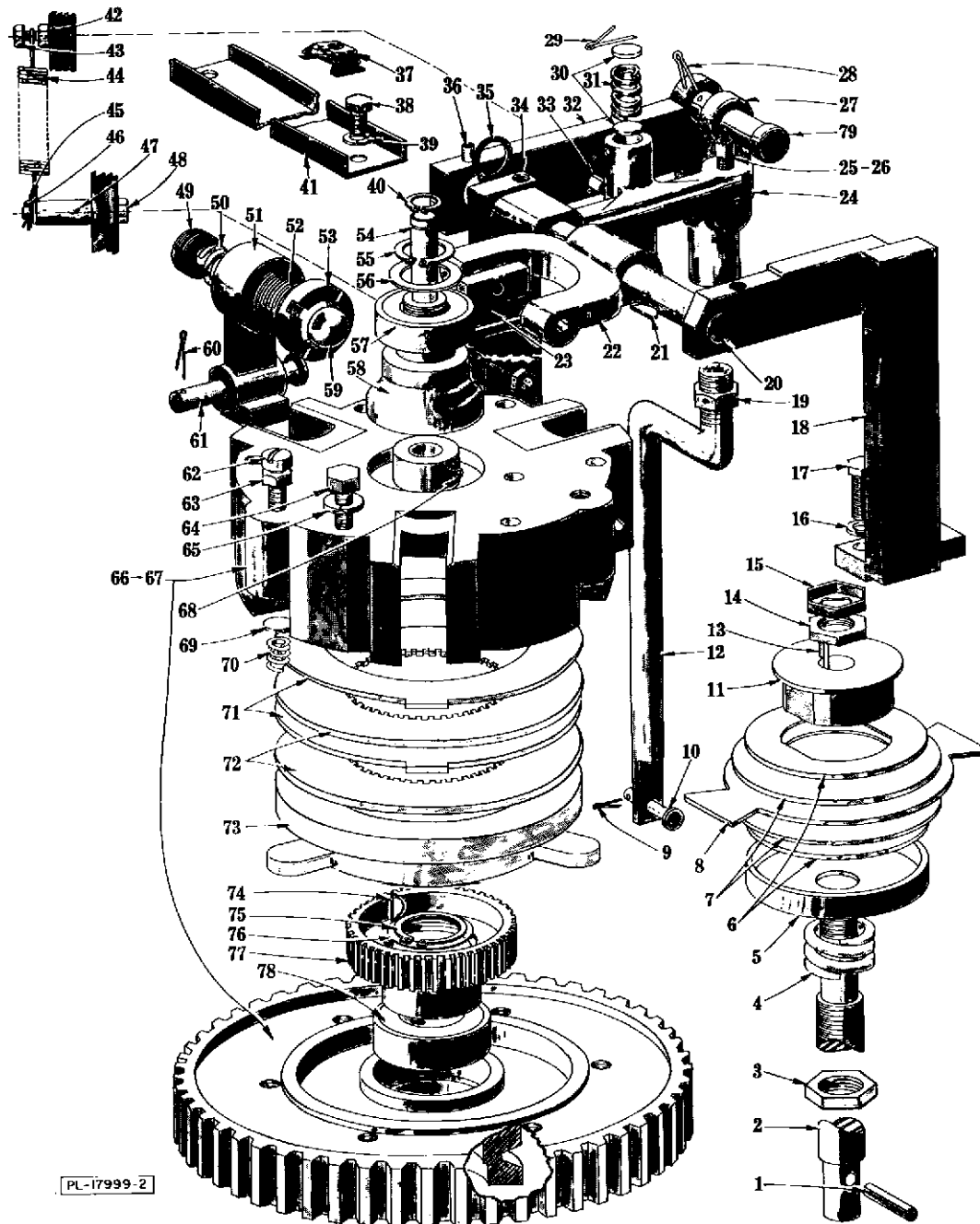


TRANSMISSION GEAR UNIT
(V1401 SERIES)

TRANSMISSION GEAR UNIT (V1401 SERIES)

ILLUS. PL-19182-2	PART NO.	NAME OF PART ²⁸	AMT.
1	RR-4-7	Retaining Ring	1
2	BB-10-16	Ball Bearing - NTN #5304	1
3	121382	Gear - Main Drive Shaft Lower (17T)	1
4	24206	Spacer - Worm Gear	1
5	120937	Key - Special	1
6	24207	Gear - Main Drive Shaft Upper (25T)	1
7	64670	Key - Special	1
8	74221	Shaft - Main Drive	1
9	BB-7-46	Ball Bearing - N.D. #7506	1
10	BB-8-33	Ball Bearing - Fafnir #205W	1
11	24210	Spacer - Clutch Shaft	1
12	24545	Upper Clutch Upper Gear Assy. (17T)	1
13	24213	Clutch - Shifting	1
14	RR-4-13	Retaining Ring	1
15	64698	Upper Clutch Lower Gear Assy. (35T)	1
16	24216	Washer - Clutch Shaft	1
17	24209	Shaft - Clutch	1
18	24538	Lower Clutch Upper Gear Assy. (41T)	1
19	60767	Washer - Clutch Shaft	1
20	RR-5-14	Retaining Ring	1
21	24213	Clutch - Shifting	1
22	24539	Lower Clutch Lower Gear Assy. (49T)	1
23	74222	Spacer - Clutch Shaft (Lower)	1
24	BB-18-22	Ball Bearing - Fafnir #7305W	1
25	RR-5-4	Retaining Ring	1
26	NS-34-8	Lock Nut - N.D. #N-07	1
27	WL-17-9	Lock Washer - TW107	1
28	BB-9-13	Ball Bearing - MRC-5207KFFG	1
29	106888-1	Shim - Planetary Shaft (.141" Thk.)	AR
30	106888-2	Shim - Planetary Shaft (.144" Thk.)	AR
31	106888-3	Shim - Planetary Shaft (.147" Thk.)	AR
32	106888-4	Shim - Planetary Shaft (.150" Thk.)	AR
33	106888-5	Shim - Planetary Shaft (.153" Thk.)	AR
34	106888-6	Shim - Planetary Shaft (.156" Thk.)	AR
35	106888-7	Shim - Planetary Shaft (.159" Thk.)	AR
36	106888-8	Shim - Planetary Shaft (.162" Thk.)	AR
37	106888-9	Shim - Planetary Shaft (.165" Thk.)	AR
38	106888-10	Shim - Planetary Shaft (.168" Thk.)	AR
39	106888-11	Shim - Planetary Shaft (.171" Thk.)	AR
40	106888-12	Shim - Planetary Shaft (.174" Thk.)	AR
41	12430-211	Key	1
42	24225	Gear - Upper Planetary Shaft (53T)	1
43	67891	Spacer - Planetary Shaft	1
44	12430-215	Key	1
45	67894	Gear - Cluster (33T) & (25T) (Use with Attachment Hub)	1
46	291607-2	Gear (33T) (Use W/O Attachment Hub)	1
*47	106890	Shaft - Planetary	1
48	67897	Chimney & Flange Assy	1
49	SC-14-75	Mach. Screw 1/4-20 x 7/16 Flat Hd	5
50	WL-9-8	Lock Washer 1/4 Csk. Ext. Shakeproof	5
51	68227	Gasket - Chimney	AR
52	67900	Spacer - Lower Bearing Upper	1
53	BB-8-32	Ball Bearing - MRC #212-MFZ	1
54	67896	Carrier - Lower Bearing	1
55	67901	Spacer - Lower Bearing Lower	1
56	120288	Lock Washer - Special	6
57	SC-40-14	Cap Screw 5/16-18 x 3/4 Soc. Fil. Hd	6
58	BR-2-31	Roller Bearing - Cup & Cone Assy	1
59	67904	Sun Gear (23T)	1
60	12430-161	Key - Sun Gear	1
61	RR-6-6	Retaining Ring	1
62	BR-2-15	Roller Bearing - Cup & Cone Assy	1
63	64982	Washer - Tongue	1
64	65275	Lock Nut - Special Bearing	1
65	WL-3-15	Lock Washer 8 Light	1
66	65277	Cap Screw - Special	1
67	67500-118	"O" Ring	1
68	67500-102	"O" Ring	1

*When ordering for mixer with serial number prior to 1849826, Reference T.S.B. 352.

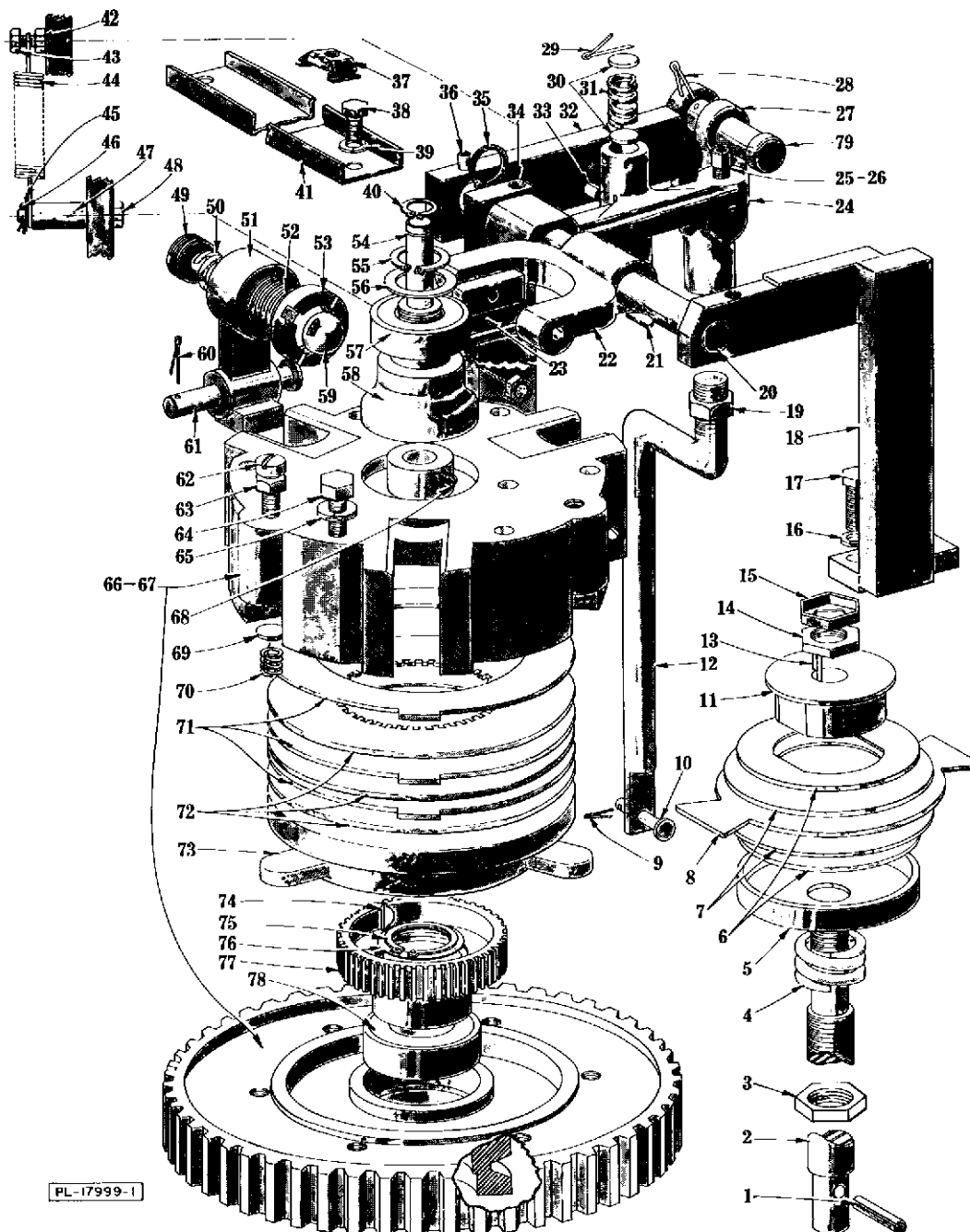


CLUTCH AND BRAKE UNIT (M802 SERIES)

ILLUS.	PART NO.	NAME OF PART ²⁸	AMT.
1	RP-2-27	Rollpin $\frac{5}{16} \times 1$ Lg	1
2	64483	Shaft - Brake	1
3	NS-17-49	Jam Nut $\frac{3}{4}$ -16 Hex Fin	1
4	10107	Spring - Brake	1
5	64481	Plate - Pressure	1
6	22489	Disc - Friction	2
7	64480	Washer - Friction	2
8	64482	Plate - Engaging	1

CLUTCH AND BRAKE UNIT (Cont.) (M802 SERIES)

ILLUS. PL-17999-2	PART NO.	NAME OF PART ²⁸	AMT.
9	PC-3-32	Cotter Pin $\frac{3}{32} \times \frac{1}{2}$	1
10	64632	Pin - Connector	1
11	64479	Hub - Brake	1
12	106900	Rod - Clutch	1
13	12430-24	Key	1
14	NS-17-40	Jam Nut $\frac{5}{16}$ -18 Hex Fin	1
15	NS-35-21	Special Nut $\frac{5}{8}$ -18 "Palnut"	1
16	WL-3-44	Lock Washer $\frac{5}{16}$ Medium	4
17	SC-36-27	Cap Screw $\frac{5}{16}$ -18 x 1 Hex Hd	4
18	64527	Clutch Shaft Support Assy. (L.H.)	1
19	NS-13-35	Full Nut $\frac{1}{2}$ -20 Hex Fin	1
20	64525	Shaft - Clutch	1
21	KW-3-10	Key #606 Woodruff	1
22	64532	Yoke - Clutch Shifting	1
23	103655	Clutch Bearing Retainer Assy	2
24	68529	Brake Arm Assy. (Incls. items 25 & 26)	1
25	SC-40-22	Cap Screw $\frac{3}{8}$ -16 x 1 Soc. Hd	1
26	NS-13-22	Full Nut $\frac{3}{8}$ -16 Hex Fin	1
27	19173-1	Clevis - Clutch Rod	1
28	PC-3-34	Cotter Pin $\frac{3}{32} \times \frac{3}{4}$	1
29	PC-3-38	Cotter Pin $\frac{3}{32} \times 1\frac{1}{4}$	1
30	11352	Disc - Spring	2
31	7433-1	Spring - Brake Arm	1
32	103654	Bracket and Clutch Arm Assy. (Incls. item 33)	1
33	PS-4-15	Spirol Pin $\frac{1}{4}$ Dia. x $1\frac{1}{8}$ Lg	1
34	64526	Clutch Shaft Support Assy. (R.H.)	1
35	RR-4-18	Retaining Ring	2
36	PS-4-15	Spirol Pin $\frac{1}{4}$ Dia. x $1\frac{1}{8}$ Lg	1
37	64652	Nut - Special	1
38	SC-36-1	Cap Screw $\frac{1}{4}$ -20 x $\frac{3}{8}$ Hex Hd	2
39	WL-3-36	Lock Washer $\frac{1}{4}$ Light	2
40	RR-4-17	Retaining Ring	1
41	64528	Channel - Top Anchoring	1
42	NS-13-1	Full Nut $\frac{1}{4}$ -20 Hex Fin	1
43	SC-36-4	Cap Screw $\frac{1}{4}$ -20 x $\frac{3}{4}$ Hex Hd	1
44	65084-1	Spring - Clutch Linkage	1
45	WS-3-20	Washer	1
46	PC-3-32	Cotter Pin $\frac{3}{32} \times \frac{1}{2}$	1
47	65122	Stud - Spring Mounting	1
48	NS-17-6	Jam Nut $\frac{5}{16}$ -18 Hex Fin	1
49	7343	Screw - Hollow	3
50	8827	Spring - Ball Operating	3
51	64430	Arm - Clutch	3
52	103652	Clutch Spring Screw Assy. (Incls. items 49, 50, 51, 53 & 49)	3
53	7344	Lock Nut	3
54	72558	Post - Guide	1
55	RR-4-7	Retaining Ring	1
56	WS-12-41	Washer	1
57	BB-15-3	Ball Bearing - N.D. #773LO4	1
58	64529	Cam - Clutch Operating	1
59	BA-2-23	Ball $\frac{1}{2}$ Dia	3
60	PC-3-34	Cotter Pin $\frac{3}{32} \times \frac{3}{4}$	3
61	64631	Pin - Clutch Arm Pivot	3
62	SC-12-2	Mach. Screw $\frac{5}{16}$ -18 x $1\frac{1}{2}$ Fil. Hd	3
63	NS-17-8	Jam Nut $\frac{5}{16}$ Hex Fin	3
64	SC-37-96	Cap Screw $\frac{5}{16}$ -18 x $2\frac{3}{4}$ Hex Hd	6
65	WL-3-44	Lock Washer $\frac{5}{16}$ Medium	6
66	110702	Driven Gear (54T) & Clutch Arm Plate Assy. (60 Hz.) (Incls. items 64 & 65)	1
67	110700	Driven Gear (51T) & Clutch Arm Plate Assy. (50 Hz.) (Incls. items 64 & 65)	1
68	SC-64-3	Set Screw $\frac{1}{4}$ -28 x $\frac{1}{4}$ Soc. Hdls., Cup Pt. "Nylok"	1
69	11352	Disc - Spring	3
70	18046	Spring - Release	3
71	64432	Disc - Outer	2
72	64433	Disc - Inner	2
73	64429-1	Plate - Pressure	1
74	64670	Key - Special	1
75	RR-4-9	Retaining Ring	1
76	WS-13-44	Washer - Shim	AR
77	64434	Hub - Spline	1
78	BB-15-8	Ball Bearing - MRC #105-KSZZ	3
79	19256-1	Pin - Clevis	1

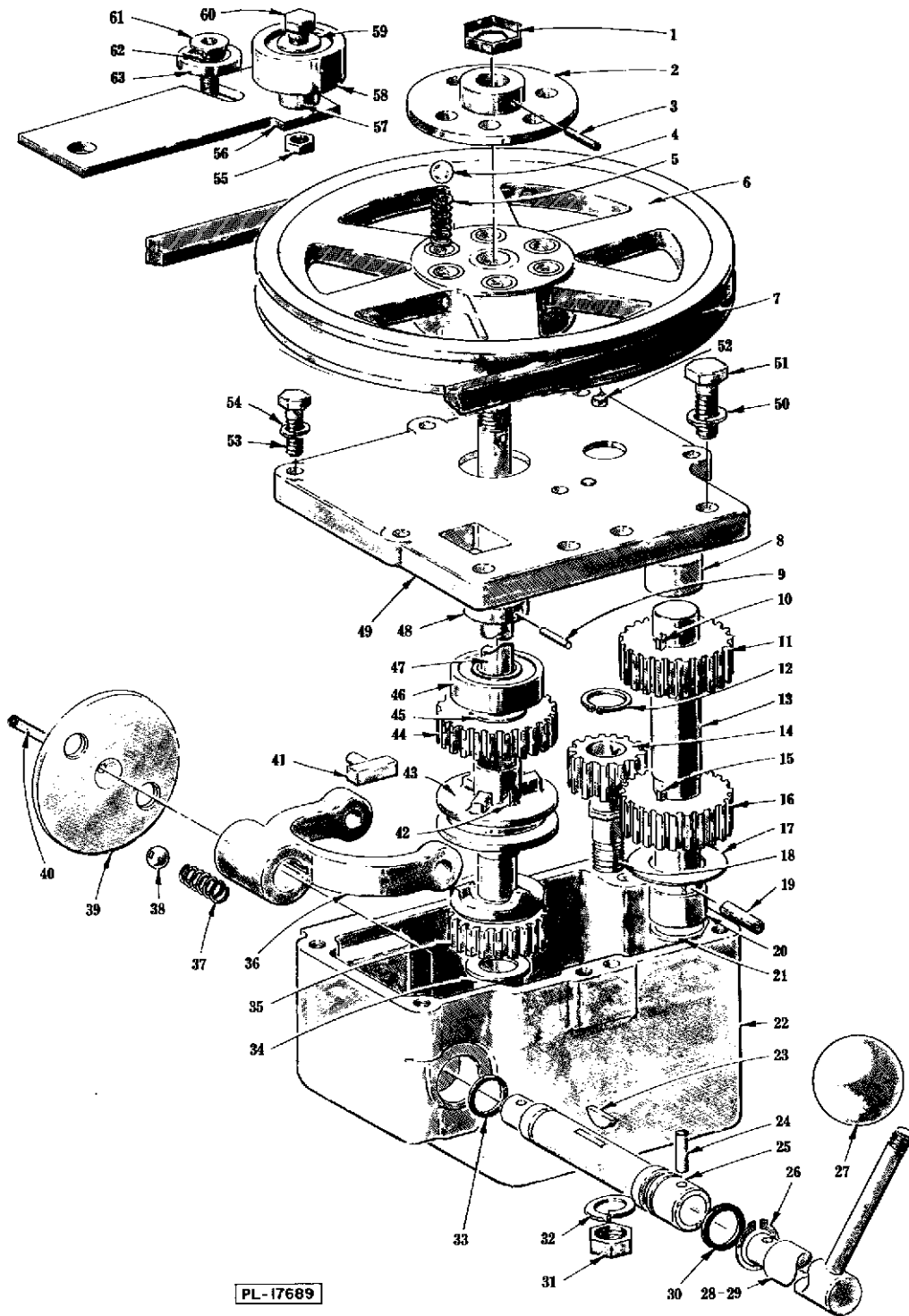


CLUTCH AND BRAKE UNIT (V1401 SERIES)

ILLUS. PL-17999-1	PART NO.	NAME OF PART ²⁸	AMT.
1	RP-2-27	Rollpin $\frac{5}{16} \times 1$ Lg	1
2	64483	Shaft - Brake	1
3	NS-17-49	Jam Nut $\frac{3}{4}$ -16 Hex Fin	1
4	10107	Spring - Brake	1
5	64481	Plate - Pressure	1
6	22489	Disc - Friction	2
7	64480	Washer - Friction	2
8	64482	Plate - Engaging	1

CLUTCH AND BRAKE UNIT (Cont.) (V1401 SERIES)

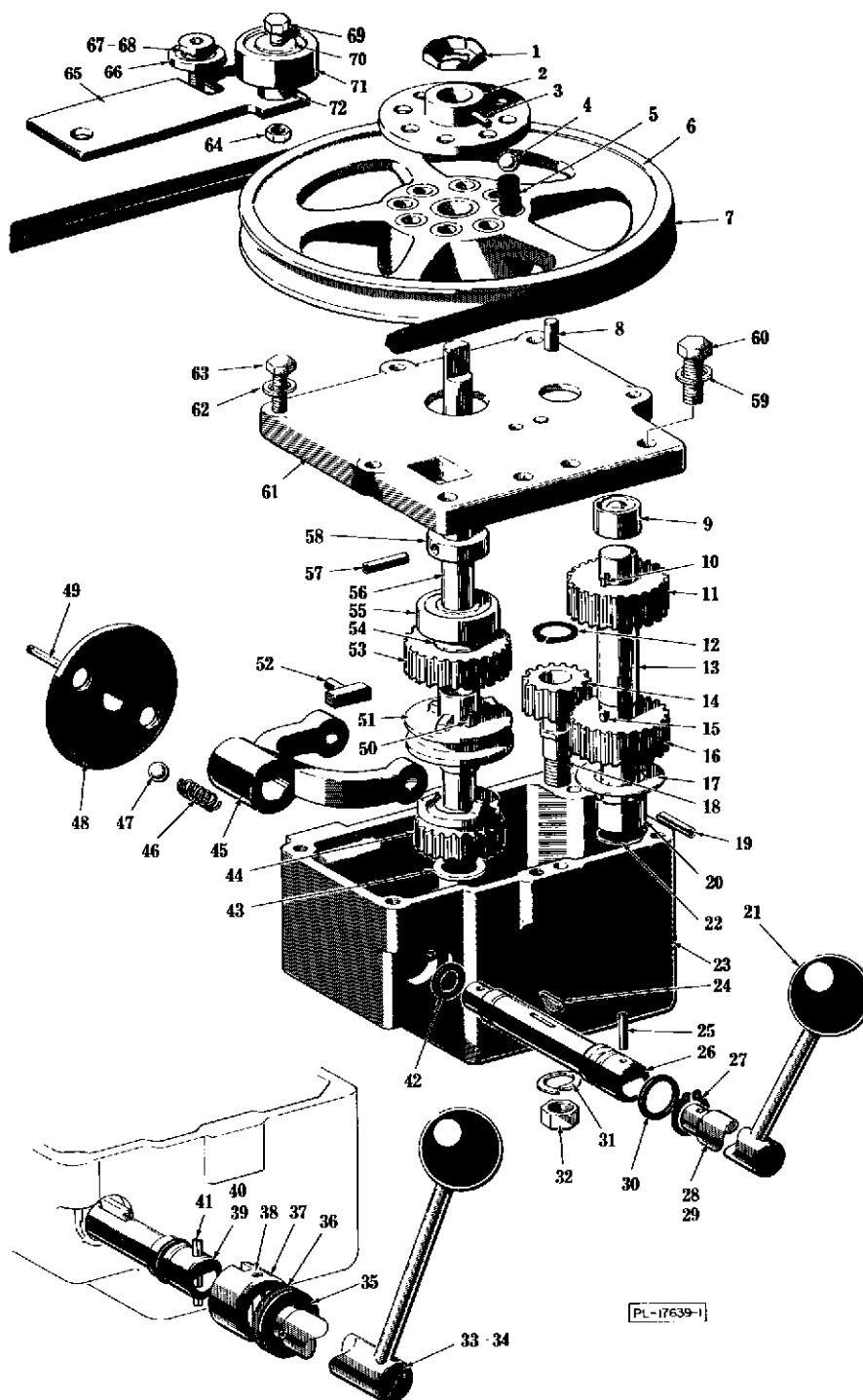
ILLUS. PL-17999-1	PART NO.	NAME OF PART ²⁸	AMT.
9	PC-3-32	Cotter Pin $\frac{3}{32} \times \frac{1}{2}$	1
10	64632	Pin - Connector	1
11	64479	Hub - Brake	1
12	106900	Rod - Clutch	1
13	12430-24	Key	1
14	NS-17-40	Jam Nut $\frac{5}{16}$ -18 Hex Fin	1
15	NS-35-21	Special Nut $\frac{5}{16}$ -18 "Palnut"	1
16	WL-3-44	Lock Washer $\frac{5}{16}$ Medium	4
17	SC-36-27	Cap Screw $\frac{5}{16}$ -18 x 1 Hex Hd	4
18	64527	Clutch Shaft Support Assy. (L.H.)	1
19	NS-13-35	Full Nut $\frac{1}{2}$ -20 Hex Fin	1
20	64525	Shaft - Clutch	1
21	KW-3-10	Key #606 Woodruff	1
22	64532	Yoke - Clutch Shifting	1
23	103655	Clutch Bearing Retainer Assy	2
24	68529	Brake Arm Assy. (Incls. items 25 & 26)	1
25	SC-40-22	Cap Screw $\frac{3}{8}$ -16 x 1 Soc. Hd	1
26	NS-13-22	Full Nut $\frac{3}{8}$ -16 Hex Fin	1
27	19173-1	Clevis - Clutch Rod	1
28	PC-3-34	Cotter Pin $\frac{3}{32} \times \frac{3}{4}$	1
29	PC-3-38	Cotter Pin $\frac{3}{32} \times 1\frac{1}{4}$	1
30	11352	Disc - Spring	2
31	7433-1	Spring - Brake Arm	1
32	103654	Bracket and Clutch Arm Assy. (Incls. item 33)	1
33	PS-4-15	Spirol Pin $\frac{1}{4}$ Dia. x $1\frac{1}{8}$ Lg	1
34	64526	Clutch Shaft Support Assy. (R.H.)	1
35	RR-4-18	Retaining Ring	2
36	PS-4-15	Spirol Pin $\frac{1}{4}$ Dia. x $1\frac{1}{8}$ Lg	1
37	64652	Nut - Special	1
38	SC-36-1	Cap Screw $\frac{1}{4}$ -20 x $\frac{3}{8}$ Hex Hd	2
39	WL-3-36	Lock Washer $\frac{1}{4}$ Light	2
40	RR-4-17	Retaining Ring	1
41	64528	Channel - Top Anchoring	1
42	NS-13-1	Full Nut $\frac{1}{4}$ -20 Hex Fin	1
43	SC-36-4	Cap Screw $\frac{1}{4}$ -20 x $\frac{3}{4}$ Hex Hd	1
44	65084-1	Spring - Clutch Linkage	1
45	WS-3-20	Washer	1
46	PC-3-32	Cotter Pin $\frac{3}{32} \times \frac{1}{2}$	1
47	65122	Stud - Spring Mounting	1
48	NS-17-6	Jam Nut $\frac{5}{16}$ -18 Hex Fin	1
49	7343	Screw - Hollow	3
50	8827	Spring - Ball Operating	3
51	64430	Arm - Clutch	3
52	103652	Clutch Spring Screw Assy. (Incls. items 49, 50, 51, 53 & 59)	3
53	7344	Lock Nut	3
54	72558	Post - Guide	1
55	RR-4-7	Retaining Ring	1
56	WS-12-41	Washer	1
57	BB-15-3	Ball Bearing - N.D. #773LO4	1
58	64529	Cam - Clutch Operating	1
59	BA-2-23	Ball $\frac{1}{2}$ Dia	3
60	PC-3-34	Cotter Pin $\frac{3}{32} \times \frac{3}{4}$	3
61	64631	Pin - Clutch Arm Pivot	3
62	SC-12-2	Mach. Screw $\frac{5}{16}$ -18 x $1\frac{1}{2}$ Fil. Hd	3
63	NS-17-8	Jam Nut $\frac{5}{16}$ -18 Hex Fin	3
64	SC-37-96	Cap Screw $\frac{5}{16}$ -18 x $2\frac{3}{4}$ Hex Hd	6
65	WL-3-44	Lock Washer $\frac{5}{16}$ Medium	6
66	110706	Driven Gear (54T) & Clutch Arm Plate Assy. (60 Hz.) (Incls. items 64 & 65)	1
67	110704	Driven Gear (52T) & Clutch Arm Plate Assy. (50 Hz.) (Incls. items 64 & 65)	1
68	SC-64-3	Set Screw $\frac{1}{4}$ -28 x $\frac{1}{4}$ Soc. Hdls., Cup Pt. "Nylok"	1
69	11352	Disc - Spring	3
70	18046	Spring - Release	3
71	64432	Disc - Outer	3
72	64433	Disc - Inner	3
73	64429-2	Plate - Pressure	1
74	64670	Key - Special	1
75	RR-4-9	Retaining Ring	1
76	WS-13-44	Washer - Shim	2
77	64434	Hub - Spline	1
78	BB-15-8	Ball Bearing - MRC #105-KSZZ	3
79	19256-1	Pin - Clevis	1



**POWER BOWL LIFT UNIT
(M802 SERIES)**

POWER BOWL LIFT UNIT (M802 SERIES)

ILLUS. PL-17689	PART NO.	NAME OF PART ²⁸	AMT.
1	NS-35-17	Special Nut $\frac{3}{16}$ -18 "Palnut"	1
2	64564	Hub & Detent Plate Assy	1
3	PS-4-9	Spirol Pin $\frac{3}{16}$ Dia. x 1 Lg	1
4	BA-2-18	Ball $\frac{3}{8}$ Dia	6
5	64616	Spring - Slip Clutch Detent	6
6	64615	V-Pulley & Bushing Assy	1
7	BV-13-18	V-Belt	1
8	BN-2-9	Needle Brg. - Torrington #M-1081	1
9	RP-2-25	Rollpin $\frac{1}{8}$ Dia. x $\frac{7}{8}$ Lg	1
10	KW-3-3	Key #404 Woodruff	1
11	12699	Gear - Output (23T)	1
12	RR-4-17	Retaining Ring	1
13	64400	Shaft - Output	1
14	64726	Idler Gear Assy. (15T)	1
15	KW-3-3	Key #404 Woodruff	1
16	12699	Gear - Output (23T)	1
17	120407	Washer	1
18	64523	Stud - Idler	1
19	PS-4-15	Spirol Pin $\frac{1}{4}$ Dia. x $1\frac{1}{8}$ Lg	1
20	BN-2-8	Needle Brg. - Torrington #B-108	1
21	64643	Oil Seal - Bowl Lift	1
22	64395	Gear Box - Bowl Lift	1
23	KW-3-10	Key #606 Woodruff	1
24	PS-3-14	Spirol Pin $\frac{3}{16}$ dia. x $\frac{7}{8}$ Lg	1
25	65567	Shaft - Yoke	1
26	RR-4-6	Retaining Ring	1
27	60468	Knob - Handle	1
28	64727-1	Lift Control Shaft & Handle Assy. (Painted)	1
29	64727-2	Lift Control Shaft & Handle Assy. (Chrome Plated)	1
30	67500-7	"O" Ring	1
31	NS-17-27	Jam Nut $\frac{1}{2}$ -13 Hex Fin	1
32	WL-4-13	Lock Washer $\frac{1}{2}$ Medium	1
33	67500-5	"O" Ring	1
34	64641	Bearing - Gear Box	1
35	103642	Lower Clutch Gear & Bearing Assy. (20T)	1
36	64410	Yoke - Reversing	1
37	7009	Spring - Ball	2
38	BA-2-18	Ball $\frac{3}{8}$ Dia	2
39	110876	Hub & Detent Plate Assy	1
40	PS-4-9	Spirol Pin $\frac{3}{16}$ Dia. x 1 Lg	1
41	64403	Shoe - Clutch	2
42	64670	Key - Special	1
43	64399	Clutch	1
44	103641	Upper Clutch Gear & Bearing Assy. (25T)	1
45	WS-9-11	Washer	1
46	BB-5-19	Ball Bearing - Fafnir #H-202P	1
47	64401	Shaft - Input	1
48	64405	Collar - Input Shaft	1
49	291045	Cover - Gear Box	1
50	WL-4-2	Lock Washer $\frac{3}{8}$ Light	2
51	SC-36-54	Cap Screw $\frac{3}{8}$ -16 x 1 Hex Hd	2
52	11800-90	Dowel	2
53	SC-36-5	Cap Screw $\frac{1}{4}$ -20 x $\frac{7}{8}$ Hex Hd	6
54	WL-3-37	Lock Washer $\frac{1}{4}$ Medium	6
55	NS-13-11	Full Nut $\frac{5}{16}$ -18 Hex Fin	1
56	64508	Plate - Belt Tightener Mounting	1
57	111669	Bushing - Belt Tightener	1
58	122101	Belt Tightener Assy	1
59	WS-4-20	Washer	1
60	64507	Special Screw	1
61	SC-61-4	Cap Screw $\frac{5}{16}$ -18 x 1 Soc. Flat Hd	1
62	WL-9-14	Lock Washer $\frac{5}{16}$ Csk. Ext. Shakeproof	1
63	68839	Washer - Belt Tightener	1

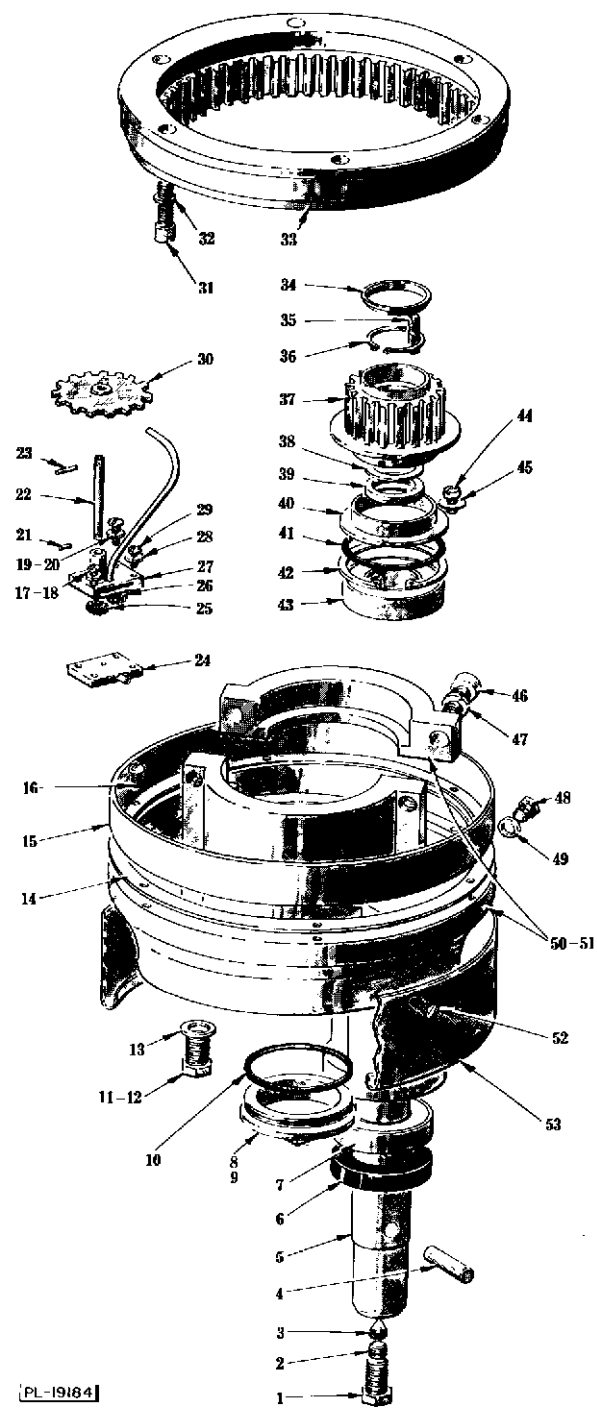


**POWER BOWL LIFT UNIT
(V1401 SERIES)**

ILLUS. PL-17639-1	PART NO.	NAME OF PART ²⁸	AMT.
1	NS-35-17	Special Nut $\frac{9}{16}$ -18 "Palnut"	1
2	67915	Hub & Detent plate Assy	1
3	PS-4-9	Spirol Pin $\frac{3}{16}$ Dia. x 1 Lg	1
4	BA-2-18	Ball $\frac{3}{8}$ Dia	8
5	64616	Spring - Slip Clutch Detent	8

POWER BOWL LIFT UNIT (Cont.) **(V1401 SERIES)**

ILLUS. PL-17639-1	PART NO.	NAME OF PART ²⁸	AMT.
6	67913	V-Pulley & Bushing Assy	1
7	BV-13-17	V-Belt	1
8	11800-90	Dowel	2
9	BN-2-9	Needle Bearing - Torrington #M-1081	1
10	KW-3-3	Key - #404 Woodruff	1
11	12699	Gear - Output (23T)	1
12	RR-4-17	Retaining Ring	1
13	64400	Shaft - Output	1
14	64726	Idler Gear Assy. (15T)	1
15	KW-3-3	Key - #404 Woodruff	1
16	12699	Gear - Output (23T)	1
17	120407	Washer	1
18	64523	Stud - Idler	1
19	PS-4-15	Spirol Pin 1/4 Dia. x 1 1/8 Lg	1
20	BN-2-8	Needle Bearing - Torrington #B-108	1
21	60468	Knob - Bowl Lift Handle	1
22	64643	Oil Seal - Bowl Lift	1
23	64395	Gear Box - Bowl Lift	1
24	KW-3-10	Key #606 Woodruff	1
25	PS-3-14	Spirol Pin 3/16 Dia. x 7/8 Lg	1
26	65567	Shaft - Yoke	1
27	RR-4-6	Retaining Ring	1
28	64727-1	Lift Control Shaft & Handle Assy. (Painted)	1
29	64727-2	Lift Control Shaft & Handle Assy. (Chrome Plated)	1
30	67500-7	"O" Ring	1
31	WL-4-13	Lock Washer 1/2 Medium	1
32	NS-17-27	Jam Nut 1/2-13 Hex Fin	1
33	68341-1	Lift Control Shaft & Handle Assy. (Painted)	1
34	68341-2	Lift Control Shaft & Handle Assy. (Chrome Plated)	1
35	WS-11-46	Washer	AR
36	120408	Washer	4
37	68339	Sleeve - Yoke Shaft Connector	1
38	PS-4-11	Spirol Pin 3/16 Dia. x 1 1/4 Lg	1
39	68261	Shaft - Yoke	1
40	67500-5	"O" Ring	1
41	PS-4-11	Spirol Pin 3/16 Dia. x 1 1/4 Lg	1
42	67500-5	"O" Ring	1
43	64641	Bearing - Gear Box	1
44	103642	Lower Clutch Gear & Brg. Assy. (20T)	1
45	64410	Yoke - Reversing	1
46	7009	Spring - Ball	2
47	BA-2-18	Ball 3/8 Dia	2
48	110876	Hub & Detent Plate Assy	1
49	PS-4-9	Spirol Pin 3/16 Dia. x 1 Lg	1
50	64670	Key - Special	1
51	64399	Clutch	1
52	64403	Shoe - Clutch	2
53	103641	Upper Clutch Gear & Brg. Assy. (25T)	1
54	WS-9-11	Washer	1
55	BB-5-19	Ball Bearing - Fafnir #H202PP	1
56	64401	Shaft - Input	1
57	RP-2-25	Rollpin 1/8 Dia. x 7/8 Lg	1
58	64405	Collar - Input Shaft	1
59	WL-4-2	Lock Washer 3/8 Light	2
60	SC-36-54	Cap Screw 3/8-16 x 1 Hex Hd	2
61	291045	Cover - Gear Box	1
62	WL-3-37	Lock Washer 1/4 Medium	6
63	SC-36-5	Cap Screw 1/4-20 x 7/8 Hex Hd	6
64	NS-13-11	Full Nut 5/16-18 Hex Fin	1
65	64508	Plate - Belt Tightener Mounting	1
66	68839	Washer - Belt Tightener	1
67	SC-61-4	Cap Screw 5/16-18 x 1 Soc. Flat Hd	1
68	WL-9-14	Lock Washer 5/16 Csk., Ext. Shakeproof	1
69	64507	Special Screw	1
70	WS-4-20	Washer	1
71	122101	Belt Tightener Assy	1
72	111669	Bushing - Belt Tightener	1

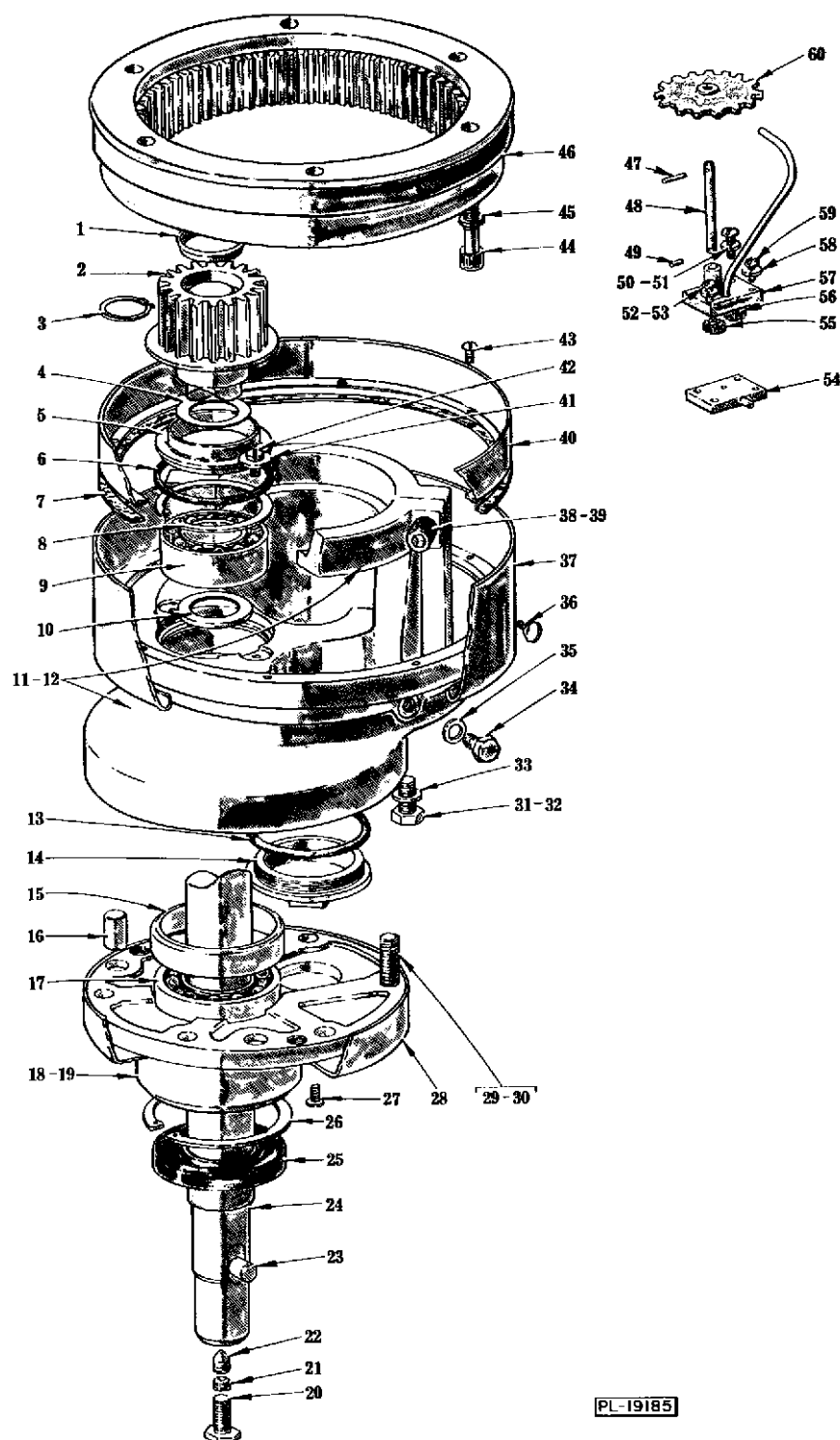


[PL-19164]

**PLANETARY UNIT
(M802 SERIES)**

PLANETARY UNIT (M802 SERIES)

ILLUS. PL-19184	PART NO.	NAME OF PART ²⁶	AMT.
1	64723	Plug - Agitator Shaft	1
2	SC-47-41	Set Screw $\frac{3}{16}$ -16 x $\frac{3}{8}$ Soc. Hdls., Cup Pt	1
3	7744	Set Screw - Hdls., Cone Pt	1
4	65717	Pin - Agitator Shaft	1
5	65749	Agitator Shaft Assy. (Incls. items 1, 2, 3 & 4)	1
6	24651	Seal - Planetary	1
7	BB-7-39	Ball Bearing - M.R.C. #207S-ZZ	1
8	64384-2	Cap - Seal (Painted)	1
9	64384-3	Cap - Seal (Aluminum)	1
10	67500-21	"O" Ring	1
11	SC-62-60	Cap Screw $\frac{1}{2}$ -20 x 1 Hex Hd. (Painted) (Drain Plug for Planetary)	1
12	SC-37-26	Cap Screw $\frac{1}{2}$ -20 x 1 Hex Hd. (Chrome Plated) (Drain Plug for Planetary)	1
13	WS-21-21	Washer	1
14	64464	Gasket - Planetary	1
15	64478	Extension - Planetary	1
16	SC-9-70	Mach. Screw 6-32 x $\frac{1}{4}$ Rd. Hd	8
17	SC-9-50	Mach. Screw 10-32 x $\frac{3}{4}$ Rd. Hd	1
18	WL-3-22	Lock Washer 10 Light	1
19	SC-9-39	Mach. Screw 8-32 x $\frac{3}{4}$ Rd. Hd	1
20	WL-3-15	Lock Washer 8 Light	1
21	538772	Dowel - $\frac{3}{32}$ Dia. x $1\frac{1}{32}$ Lg	1
22	*	Shaft - Oil Pump	1
23	RP-2-8	Roll Pin $\frac{5}{64}$ Dia. x $1\frac{1}{16}$ Lg	1
24	64644	Bottom Plate Planetary Oil Pump Assy	1
25	*	Gear - Oil Pump (15T) (Slotted)	1
26	290277	Gear - Oil Pump (15T)	1
27	123681	Housing & Tube Assy	1
28	WL-3-22	Lock Washer 10 Light	2
29	SC-9-51	Mach. Screw 10-32 x $\frac{7}{8}$ Rd. Hd	2
30	64614	Drive Gear Assy. (15T)	1
31	SC-40-27	Cap Screw $\frac{3}{8}$ -16 x $2\frac{1}{4}$ Soc. Fil. Hd	6
32	WL-4-1	Lock Washer $\frac{3}{8}$ High Collar	6
33	64382	Gear - Internal (59T)	1
34	60071	Cap - Oil Retaining	1
35	74288	Key - Internal Pinion	1
36	RR-5-8	Retaining Ring	1
37	64732	Internal Pinion & Oil Deflector Assy. (18T)	1
38	60768	Shim - Internal Pinion	AR
39	65408	Spacer - Agitator Shaft	1
40	73011	Oil Baffle - Planetary	1
41	67500-21	"O" Ring	1
42	RR-4-24	Retaining Ring	1
43	BB-6-36	Ball Bearing - M.R.C. #306 S-ZZ	1
44	SC-11-72	Mach. Screw $\frac{1}{4}$ -20 x $\frac{3}{8}$ Fil. Hd	2
45	WS-3-46	Washer	2
46	SC-40-35	Cap Screw $\frac{1}{2}$ -13 x $1\frac{1}{2}$ Soc. Fil. Hd	2
47	WL-4-14	Lock Washer $\frac{1}{2}$ High Collar	2
48	64465-3	Plug - Oil Fill	1
49	WS-21-20	Washer	1
50	103645-1	Planetary & Bearing Cap Assy. (Painted) (Incls. items 46 & 47)	1
51	103645-2	Planetary & Bearing Cap Assy. (Chrome Plated) (Incls. items 46 & 47)	1
52	70641-11	Thumb Screw	2
53	64484	Cup - Drip	1
	290232-1	Planetary Oil Pump Assy. (Incls. items 17 thru 27 & 30)	1
	104532-1	Planetary Unit Assy. (Painted) (Incls. items 5, 6, 7, 11, 13 thru 30, 34 thru 45, 48 & 50)	1
	104532-2	Planetary Unit Assy. (Chrome Plated) (Incls. items 5, 6, 7, 12 thru 30, 34 thru 45, 48 & 51)	1
	*186273-2	Oil Pump Service Kit (Incls. items 21, 22 & 25)	1

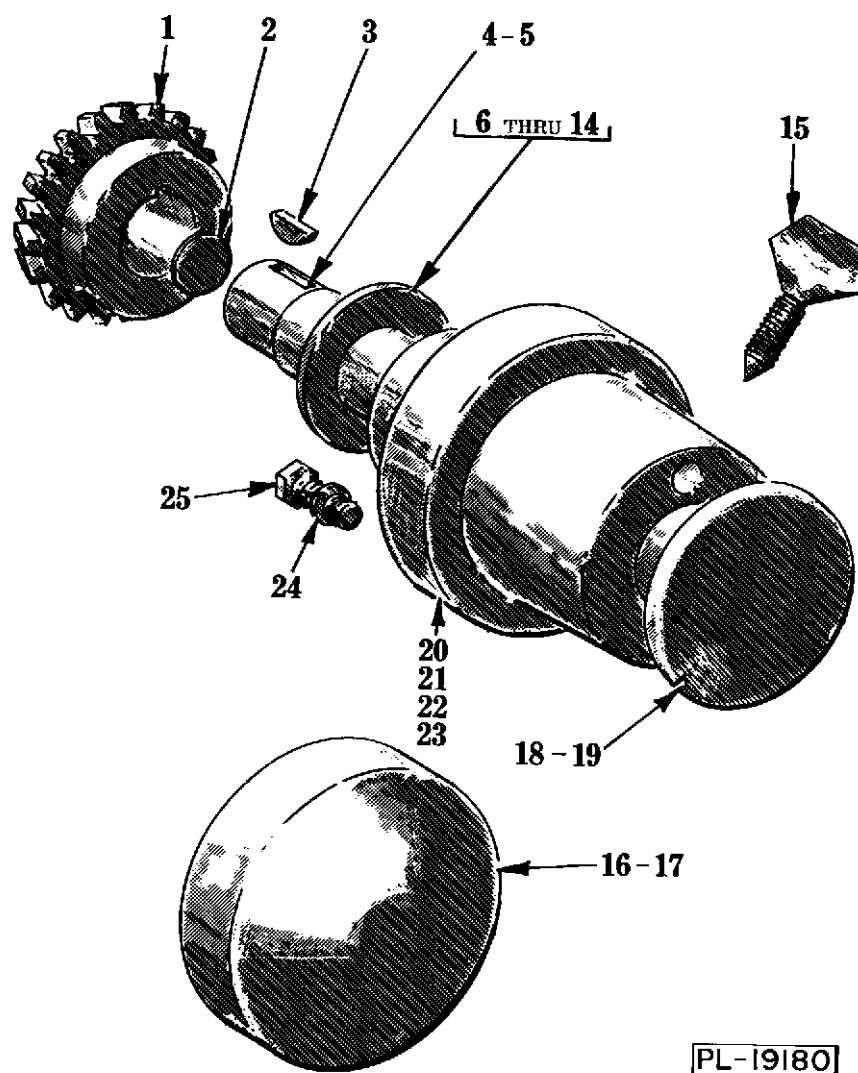


PL-19185

**PLANETARY UNIT
(V1401 SERIES)**

PLANETARY UNIT (V1401 SERIES)

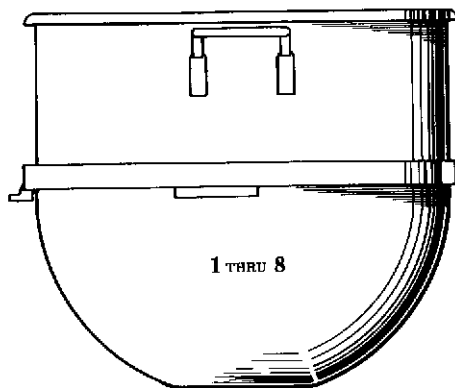
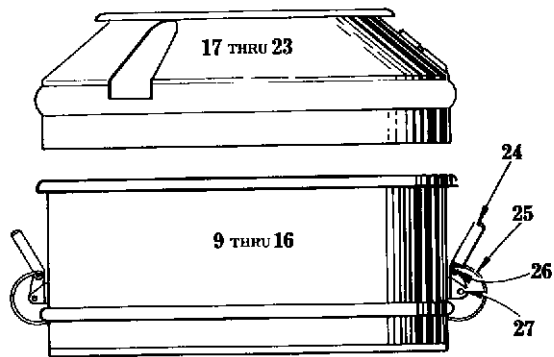
ILLUS. PL-19185	PART NO.	NAME OF PART ²⁸	AMT.
1	60071	Cap - Oil Retaining	1
2	67886	Internal Pinion & Oil Deflector Assy. (18T)	1
3	RR-6-8	Retaining Ring	1
4	68277	Shim - Internal Pinion	AR
5	73011	Baffle - Planetary Oil	1
6	67500-21	"O" Ring	1
7	64464	Gasket - Planetary	1
8	RR-4-24	Retaining Ring	1
9	BB-9-44	Ball Bearing - MRC #5207-KF	1
10	67902	Spacer - Agitator Shaft	1
11	110360-1	Planetary & Brg. Cap Assy. (Painted) (Incls. items 38 & 39)	1
12	110360-2	Planetary & Brg. Cap Assy. (Chrome Plated) (Incls. items 38 & 29)	1
13	67500-21	"O" Ring	1
14	64384-2	Cap - Seal	1
15	67903	Locator - Bearing	2
16	11800-237	Dowel	1
17	BB-9-45	Ball Bearing - MRC #5210-KF	1
18	67921-1	Plate - Bearing (Painted)	1
19	67921-2	Plate - Bearing (Chrome Plated)	1
20	64723	Plug - Agitator Shaft	1
21	SC-47-41	Set Screw 3/8-16 x 3/8 Hds., Cup Pt	1
22	7744	Set Screw - Cone Pt	1
23	77757	Pin - Agitator Shaft	1
24	73821	Agitator Shaft Unit Assy. (Incls. items 20, 21, 22 & 23)	1
25	68045	Seal - Planetary	1
26	RR-6-7	Retaining Ring	2
27	80531	Screw - Special "Nylok"	1
28	68041	Cover - Planetary Brg. Plate	6
29	SC-62-19	Cap Screw 1/2-13 x 2 Hex Hd	6
30	WL-4-13	Lock Washer 1/2 Medium	1
31	SC-62-60	Cap Screw 1/2-20 x 1 Hex Hd. (Painted) (Drain Plug for Planetary)	1
32	SC-37-26	Cap Screw 1/2-20 x 1 Hex Hd. (Chrome Plated) (Drain Plug for Planetary)	1
33	WS-21-21	Washer	1
34	64465-3	Plug - Oil Fill	1
35	WS-21-20	Washer	2
36	70641-11	Thumb Screw 8-32	1
37	67895	Cup - Drip	2
38	SC-40-35	Cap Screw 1/2-13 x 1 1/2 Soc. Fil. Hd	2
39	WL-4-14	Lock Washer 1/2 High Collar	1
40	64478	Extension - Planetary	2
41	WS-3-46	Washer	2
42	SC-11-72	Mach. Screw 1/4-20 x 3/8 Fil. Hd	8
43	SC-9-70	Mach. Screw 6-32 x 1/4 Rd. Hd	6
44	SC-40-28	Cap Screw 3/16 x 2 1/2 Soc. Fil. Hd	6
45	WL-4-1	Lock Washer 3/8 High Collar	1
46	67907	Gear - Internal (59T)	1
47	RP-2-8	Rollpin 5/64 Dia. x 1 1/16 Lg	1
48	*	Shaft - Oil Pump	1
49	538772	Dowel 3/32 Dia. x 1 1/32 Lg	1
50	SC-9-39	Mach. Screw 8-32 x 3/4 Rd. Hd	1
51	WL-3-15	Lock Washer 8 Light	1
52	SC-9-50	Mach. Screw 10-32 x 3/4 Rd. Hd	1
53	WL-3-22	Lock Washer 10 Light	1
54	64844	Bottom Plate Planetary Oil Pump Assy	1
55	*	Gear - Oil Pump (15T) (Slotted)	1
56	290277	Gear - Oil Pump (15T)	1
57	123681	Housing & Tube Assy	2
58	WL-3-22	Lock Washer 10 Light	2
59	SC-9-51	Mach. Screw 10-32 x 7/8 Rd. Hd	1
60	64614	Drive Gear Assy. (15T)	1
	290232-2	Planetary Oil Pump Assy. (Incls. items 47 thru 57 & 60)	1
	89050-1	Planetary Unit Assy. (Painted) (Incls. items 1 thru 11, 15, 16, 17, 18, 24, 25, 26, 29, 30, 31, 33, 34, 40, 41, 42, 43 & 47 thru 60)	1
	89050-2	Planetary Unit Assy. (Chrome Plated) (Incls. items 1 thru 10, 12, 15, 16, 17, 19, 24, 25, 26, 29, 30, 32, 33, 34, 40, 41, 42, 43, & 47 thru 60)	1
	*186273-2	Oil Pump Service Kit (Incls. items 48, 49 & 55)	1



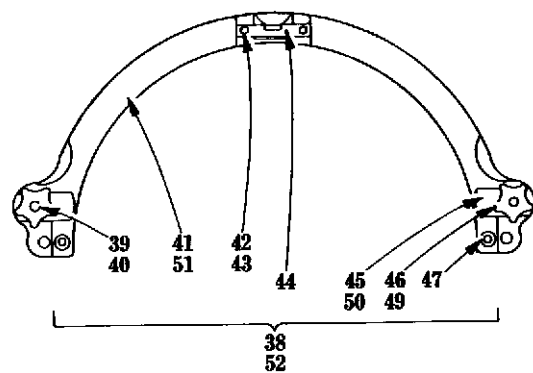
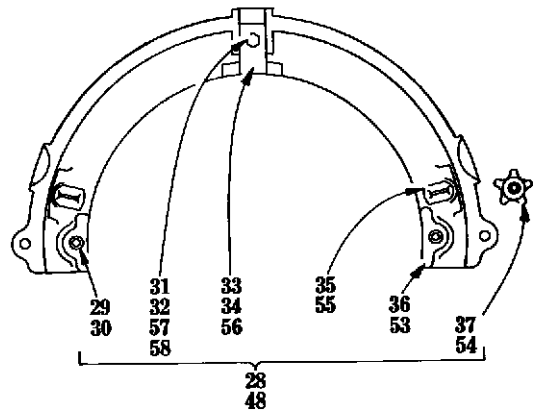
ATTACHMENT HUB UNIT

ATTACHMENT HUB UNIT

ILLUS. PL-19180	PART NO.	NAME OF PART ^{2a}	AMT.
1	64422	Bevel Pinion (Attach.) (21T)	1
2	PL-3-22	Plug 1 1/8 Expansion	1
3	KW-3-15	Key 807 Woodruff	1
4	103911	Sleeve - Square Drive (#22 Attachment Hub)	1
5	291679	Sleeve - Square Drive (#12 Attachment Hub)	1
6	11091-3	Shim - Bevel Pinion (.056" Thk.)	AR
7	11091-4	Shim - Bevel Pinion (.062" Thk.)	AR
8	11091-5	Shim - Bevel Pinion (.080" Thk.)	AR
9	11091-6	Shim - Bevel Pinion (.106" Thk.)	AR
10	11091-7	Shim - Bevel Pinion (.092" Thk.)	AR
11	11091-8	Shim - Bevel Pinion (.086" Thk.)	AR
12	11091-9	Shim - Bevel Pinion (.098" Thk.)	AR
13	11091-10	Shim - Bevel Pinion (.068" Thk.)	AR
14	11091-11	Shim - Bevel Pinion (.074" Thk.)	AR
15	108197-2	Thumb Screw 1/2-12	1
16	64612-1	Cover (Painted) (Plugs Attachment Hub Hole)	1
17	64612-2	Cover (Aluminium) (Plugs Attachment Hub Hole)	1
18	24799-1	Plug - Attachment Hole (#22 Attachment Hub)	1
19	114824-1	Plug - Attachment Hole (#12 Attachment Hub)	1
20	64380-3	Hub - Attachment (#22 Painted) (ML-16449, ML-16450, ML-19663 & ML-19664)	1
21	64380-2	Hub - Attachment (#22 Chrome Plated) (ML-18820, ML-31132, ML-19665 & ML-19666) ...	1
22	291680-3	Hub - Attachment (#12 Painted)	1
23	291680-2	Hub - Attachment (#12 Chrome Plated)	1
24	WL-4-2	Lock Washer 3/8 Light	4
25	SC-36-57	Cap Screw 3/8-16 x 1 1/4 Hex Hd	4



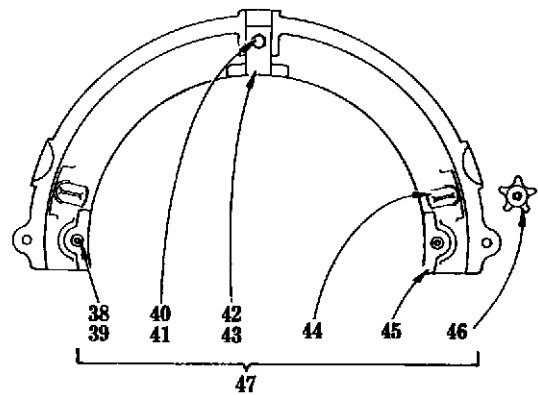
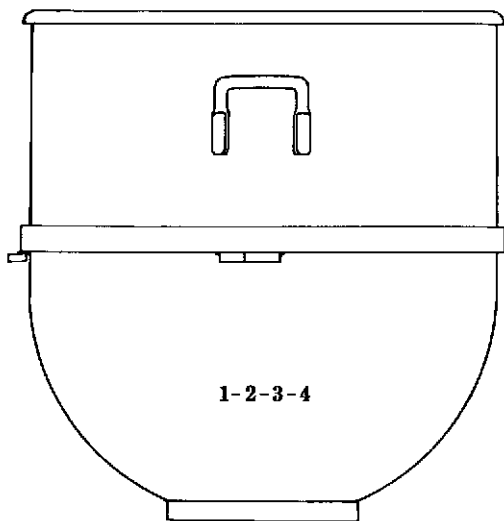
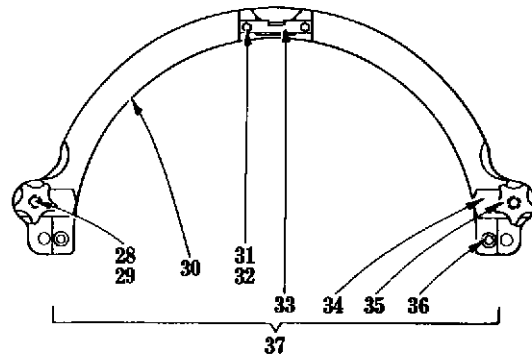
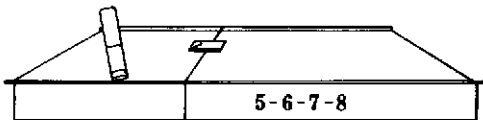
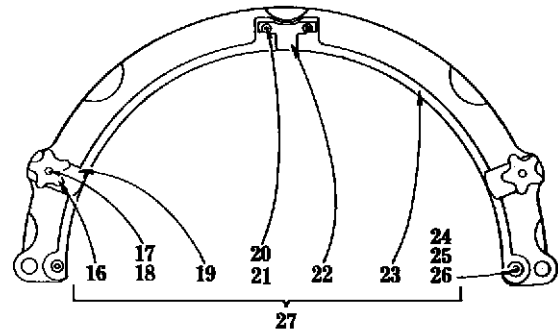
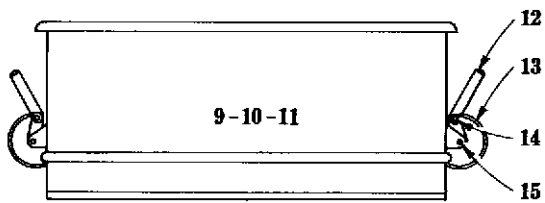
PL-17691



BOWLS AND EQUIPMENT (M802 SERIES)

BOWLS AND EQUIPMENT (M802 SERIES)

ILLUS. PL-17691	PART NO.	NAME OF PART ²⁸	AMT.
1	84920	Bowl - 80 Qt. (SST)	1
2	66465-1	Bowl - 80 Qt. (Tinned)	1
3	66462	Bowl - 60 Qt. (SST)	1
4	66461	Bowl - 60 Qt. (Tinned)	1
5	104433	Bowl - 40 Qt. (SST)	1
6	104432	Bowl - 40 Qt. (Tinned)	1
7	104416	Bowl - 30 Qt. (SST)	1
8	104415	Bowl - 30 Qt. (Tinned)	1
9	8569-4	Extension - 80 Qt. Bowl (SST) (Flange Top Bowl) (Incls. items 24, 25, 26 & 27)	1
10	8569-2	Extension - 80 Qt. Bowl (Tinned) (Flange Top Bowl) (Incls. items 24, 25, 26 & 27)	1
11	8569-8	Extension - 60 Qt. Bowl (SST) (Flange Top Bowl) (Incls. items 24, 25, 26 & 27)	1
12	8569-6	Extension - 60 Qt. Bowl (Tinned) (Flange Top Bowl) (Incls. items 24, 25, 26 & 27)	1
13	7985-2	Extension - 40 Qt. Bowl (SST) (Flange Top Bowl)	1
14	7985-1	Extension - 40 Qt. Bowl (Tinned) (Flange Top Bowl)	1
15	6474-2	Extension - 30 Qt. Bowl (SST) (Flange Top Bowl)	1
16	6474-1	Extension - 30 Qt. Bowl (Tinned) (Flange Top Bowl)	1
17	82443-8	Splash Cover Assy. - 80 Qt. (SST)	1
18	82443-7	Splash Cover Assy. - 80 Qt. (Tinned)	1
19	104681	Cover - Splash (60 Qt.) (Plastic)	1
20	82443-4	Splash Cover Assy. - 40 Qt. (SST)	1
21	82443-3	Splash Cover Assy. - 40 Qt. (Tinned)	1
22	82443-2	Splash Cover Assy. - 30 Qt. (SST)	1
23	82443-1	Splash Cover Assy. - 30 Qt. (Tinned)	1
24	11881	Handle - Clamp (80 or 60 Qt.) (For items 9 thru 12)	2
25	62234-2	Spring - Bowl Clamp (80 or 60 Qt.) (Flange Top Bowl) (For items 9 thru 12)	2
26	RP-2-7	Rollpin $\frac{3}{16}$ Dia. x $1\frac{1}{8}$ Lg. (For items 9 thru 12)	2
27	RP-2-35	Rollpin $\frac{3}{16}$ Dia. x $\frac{5}{8}$ Lg. (For items 9 thru 12)	2
28	24653-2	Bowl Adapter Assy. (SST) (80-40 Qt. & 80-30 Qt.) (Incls. items 29 thru 37)	1
29	WL-4-17	Lock Washer $\frac{5}{8}$ Light	2
30	7629-2	Stud - Bowl Locating	2
31	SC-41-43	Cap Screw $\frac{1}{2}$ -13 x 1 Hex Hd	1
32	WL-6-35	Lock Washer $\frac{1}{2}$ Light	1
33	7624-2	Retainer - Bowl	1
34	111671	Shim - (.010" Thk.)	AR
35	8100-2	Stud - Clamp	2
36	111165-2	Adapter (80-40 Qt. & 80-30 Qt.)	1
37	111268-2	Knob - Clamp Stud	2
38	61033-2	Bowl Adapter Assy. (SST) (80-60 Qt.) (Incls. items 39 thru 47)	1
39	22196	Bolt - Bowl Lock	2
40	WL-4-11	Lock Washer $\frac{1}{2}$ Medium	2
41	65791-2	Adapter (80-60 Qt.)	1
42	SC-37-88	Cap. Screw $\frac{5}{16}$ -18 x $1\frac{1}{4}$ Hex Hd	2
43	WL-3-47	Lock Washer $\frac{5}{16}$ Medium	2
44	24289	Retainer - Bowl	1
45	65532-2	Clamp - Bowl Adapter	2
46	8101-2	Knob - Clamp Stud (Deluxe)	2
47	24300	Pin - Bowl Locating	2
48	24653-1	Bowl Adapter Assy. (80-40 Qt. & 80-30 Qt.) (Incls. items 29, 30, 34, & 53 thru 58)	1
49	8101-1	Knob - Clamp Stud (Tinned)	2
50	65532-1	Clamp Bowl Adapter	2
51	65791-1	Adapter (80-60 Qt.)	1
52	61033-1	Bowl Adapter Assy. (60 Qt.) (Incls. items 39, 40, 42, 43, 44, 47, 49, 50 & 51)	1
53	111165-1	Adapter (80-40 Qt. & 80-30 Qt.)	1
54	111268-1	Knob - Clamp Stud	2
55	8100-1	Stud - Clamp	2
56	7624-1	Retainer - Bowl	1
57	WL-4-11	Lock Washer $\frac{1}{2}$ Medium	1
58	SC-62-37	Cap Screw $\frac{1}{2}$ -13 x 1 Hex Hd	1
	66468-1	Bowl - 100 Qt. (Not Shown)	1

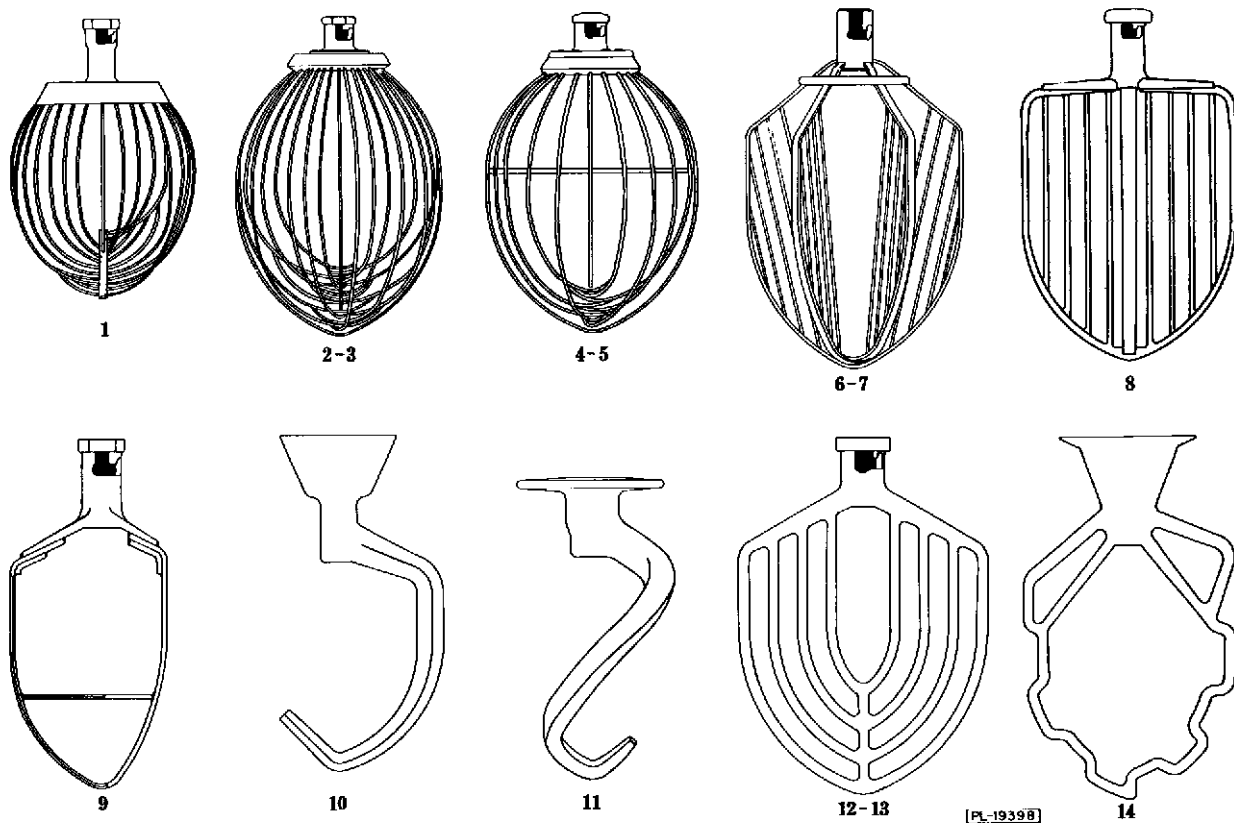


[PL-19238]

BOWLS AND EQUIPMENT (V1401 SERIES)

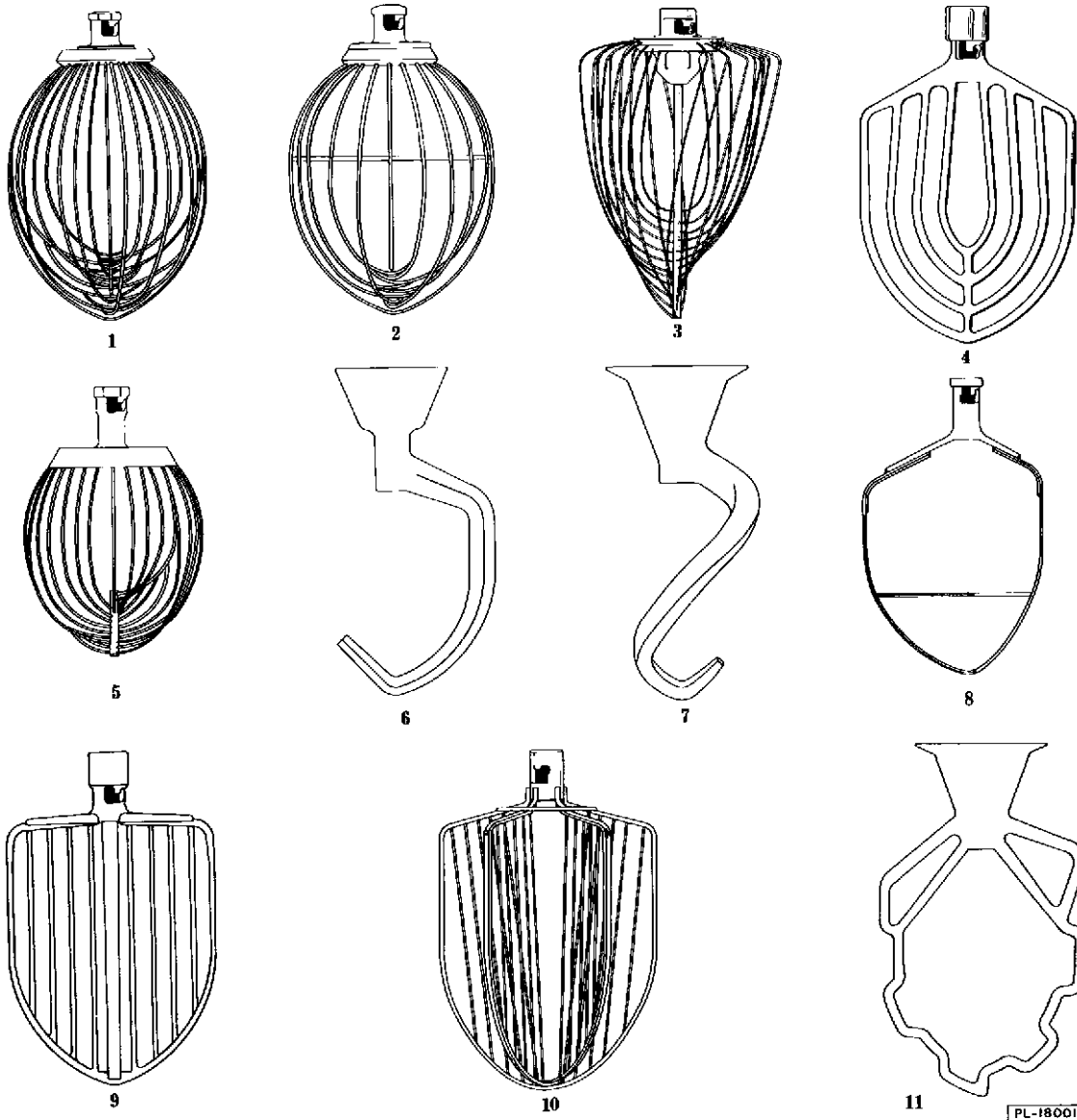
BOWLS AND EQUIPMENT (V1401 SERIES)

ILLUS. PL-19238	PART NO.	NAME OF PART ²⁸	AMT.
1	88908-2	Bowl - 140 Qt.	1
2	66465-1	Bowl - 80 Qt. (Use with 80 Qt. Adapter)	1
3	66461	Bowl - 60 Qt. (Use with 60 Qt. Adapter)	1
4	104432	Bowl - 40 Qt. (Use with 80 & 40 Qt. Adapters)	1
5	23298-1	Splash Cover Assy. (140 Qt.)	1
6	82443-7	Splash Cover Assy. (100 & 80 Qt.)	1
7	104681	Splash Cover (60 Qt.) (Plastic)	1
8	82443-3	Splash Cover Assy. (40 Qt.)	1
9	8569-2	Extension Assy. (100 & 80 Qt. Flange Top Bowl) (Incls. items 12 thru 15)	1
10	8569-6	Extension Assy. (60 Qt. Flange Top Bowl) (Incls. items 12 thru 15)	1
11	7985-1	Extension Assy. (40 Qt. Bowl)	1
12	11881	Handle - Clamp (For items 9 & 10)	2
13	62234-2	Spring - Clamp (Flange Top Bowl) (For items 9 & 10)	2
14	RP-2-7	Rollpin $\frac{3}{16}$ Dia. x $1\frac{1}{8}$ Lg. (For items 9 & 10)	2
15	RP-2-35	Rollpin $\frac{3}{16}$ Dia. x $\frac{5}{8}$ Lg. (For items 9 & 10)	2
16	8101-1	Knob - Clamp Stud	2
17	22196	Bolt - Bowl Lock	2
18	WL-4-11	Lock Washer $\frac{1}{2}$ Medium	2
19	65532-1	Clamp - Bowl Adapter	2
20	SC-36-40	Cap Screw $\frac{5}{16}$ -18 x $1\frac{1}{4}$ Hex Hd	2
21	WL-3-47	Lock Washer $\frac{5}{16}$ Medium	2
22	21020	Retainer - Bowl	1
23	65792	Adapter (140 to 80 Qt.)	1
24	62110	Stud - Bowl Locating	2
25	WL-4-4	Lock Washer $\frac{3}{8}$ Light	2
26	NS-13-25	Full Nut $\frac{3}{8}$ -16 Hex Fin	2
27	62111	80 Qt. Bowl Adapter Assy. Unit (Incls. items 16 thru 26)	1
28	22196	Bolt - Bowl Lock	2
29	WL-4-11	Lock Washer $\frac{1}{2}$ Medium	2
30	65791-1	Adapter (80 to 60 Qt.)	1
31	SC-37-88	Cap Screw $\frac{5}{16}$ -18 x $1\frac{1}{4}$ Hex Hd	2
32	WL-3-47	Lock Washer $\frac{5}{16}$ Medium	2
33	24289	Retainer - Bowl	1
34	65532-1	Clamp - Bowl Adapter	2
35	8101-1	Knob - Clamp Stud	2
36	24300	Pin - Bowl Locating	2
37	61033-1	60 Qt. Adapter Assy. Unit (Incls. items 28 thru 36)	1
38	7629-2	Stud - Bowl Locating	2
39	WL-4-17	Lock Washer $\frac{5}{8}$ Light	2
40	SC-62-37	Cap Screw $\frac{1}{2}$ -13 x 1 Hex Hd	1
41	WL-4-11	Lock Washer $\frac{1}{2}$ Medium	1
42	7624-1	Retainer - Bowl	1
43	111671	Shim (.010" Thk.)	AR
44	8100-1	Stud - Clamp	2
45	111165-1	Adapter (80 to 40 Qt.)	1
46	111268-1	Knob - Clamp Stud	2
47	24653-1	40 Qt. Bowl Adapter Assy. Unit (Incls. items 38 thru 46)	1



AGITATORS (M802 SERIES)

ILLUS. PL-19398	PART NO.	PART NO.	PART NO.	PART NO.	NAME OF PART ²⁸	AMT.
	80 Qt.	60 Qt.	40 Qt.	30 Qt.		
1	16418-1	—	—	—	"K" Spiral Whip	1
2	23522-2	24900-2	23591-2	10327-2	"D" Wire Whip (SST)	1
3	—	—	—	10327-1	"D" Wire Whip (Tinned) (Not Shown)	1
4	—	—	60132-2	72871	"I" Wire Whip (SST) (Not Shown)	1
5	121036	60090	—	—	"I" Wire Whip (Tinned)	1
6	123489	123486	123682	—	"C" Six Wing Whip	1
7	—	—	—	123714	"C" Four Wing Whip (Not Shown)	1
8	15320	—	—	—	"J" Four Wing Beater	1
9	104229	68096	68095	68822	"P" Pastry Knife	1
10	—	—	80693	72858	"E" Dough Arm	1
11	86841	121071	—	—	"ED" Dough Arm (Spiral)	1
12	24860	24308-2	24847	60052-2	"B" Flat Beater (SST)	1
13	23490	24308-1	23620	60052-1	"B" Flat Beater (Alum.)	1
14	9875-1	60069	8400	10326	"S" Sweet Dough Arm	1



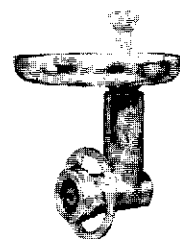
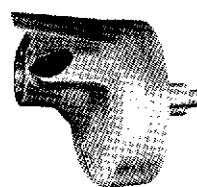
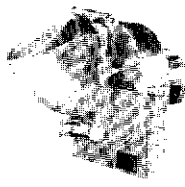
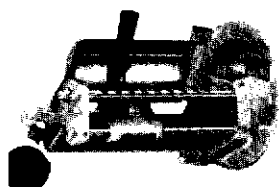
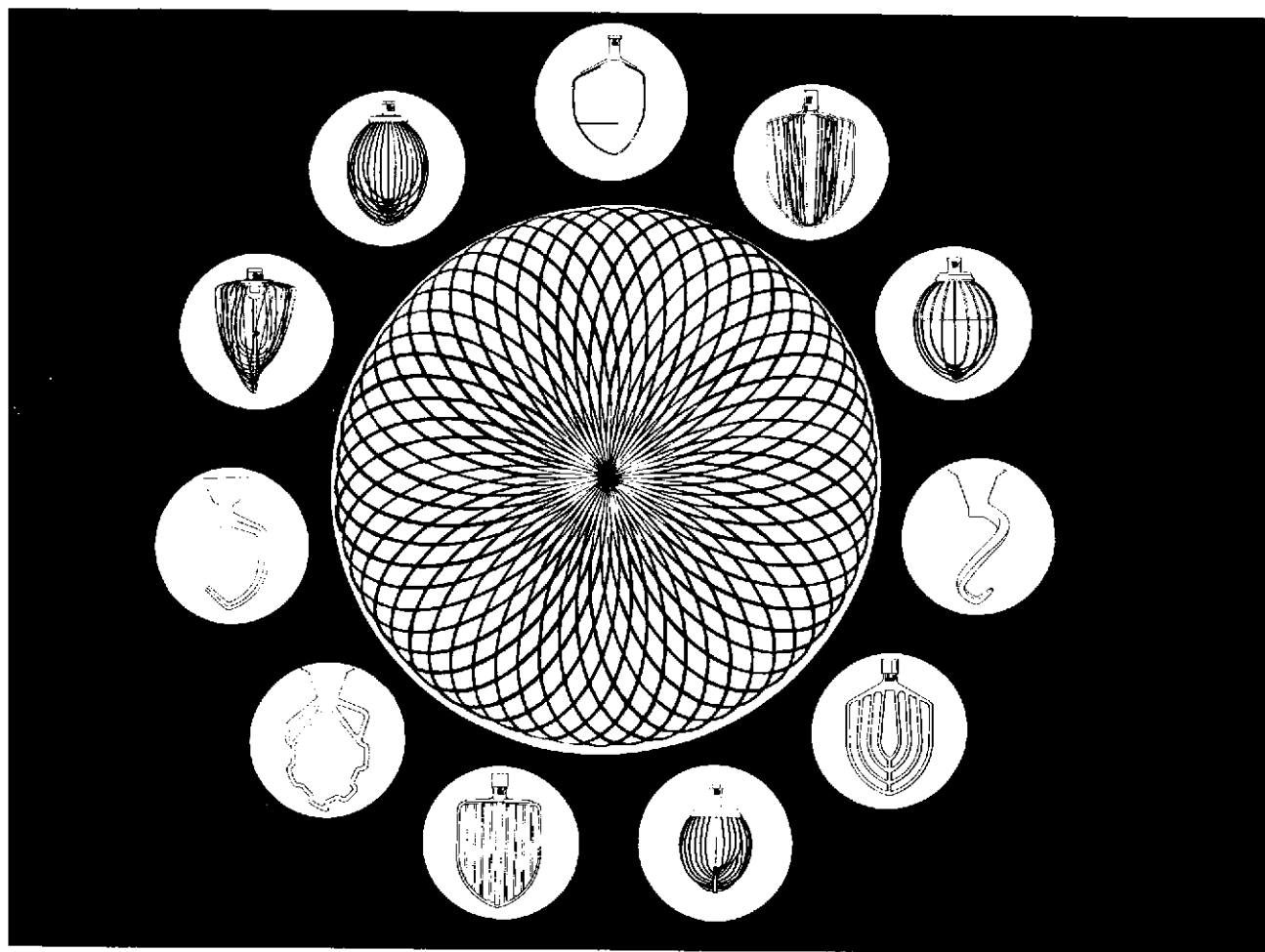
AGITATORS (V1401 SERIES)

ILLUS. PL-18001	PART NO.	PART NO.	PART NO.	PART NO.	NAME OF PART ²⁸	AMT.
	140 Qt.	80 Qt.	60 Qt.	40 Qt.		
1	24647-2	23522-2	24900-2	23591-2	"D" Wire Whip	1
2	121035	121036	60090	60132-2	"I" Wire Whip	1
3	19220	—	—	—	"Q" Spiral Whip	1
4	68064	23490	24308-1	23620	"B" Flat Beater	1
5	—	16418-1	—	—	"K" Spiral Whip	1
6	—	—	—	80693	"E" Dough Arm	1
7	114276	8684	121071	—	"ED" Dough Arm	1
8	104225	104229	68096	68095	"P" Pastry Knife	1
9	24705-2	15320	—	—	"J" Wing Beater	1
10	123678	123489	123486	123682	"C" Six Wing Whip	1
11	69854	9875-1	60069	8400	"S" Sweet Dough Arm	1
	123677	—	—	—	"CH" Six Wing Whip (Not Shown)	1

USE AND APPLICATIONS HANDBOOK

For **HOBART** Mixer

Agitators, Attachments and Accessories



Economical, Dependable, Adaptable ... Your Hobart Mixer

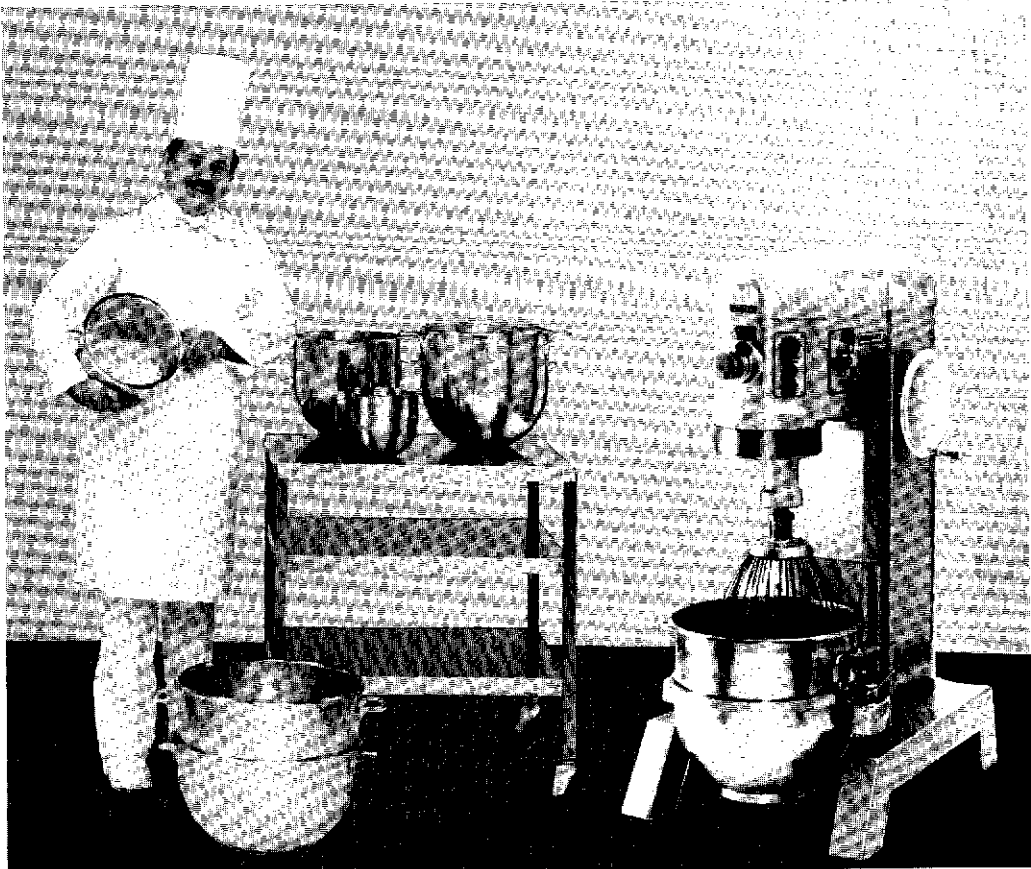
A Hobart Mixer brings profit to your operation every time you use it. Uniform mixing reduces waste and improves process control. Smooth surfaces and durable materials make cleanup fast and easy. This all means economical operation for you.

Because of its reliability, your Hobart Mixer will give years of dependable, low cost service.

The Hobart Mixer's Planetary Action assures uniform mixing. The mix arm reaches every part of the batch. It rotates on its axis opposite to the direction that it moves around the bowl. Thorough mixing, blending and aerating of ingredients yields consistent, predictable results every time. You can depend on it.

Hobart Mixers are flexible in the kitchen. They quickly accept attachments to do many different jobs. Most models allow use of bowls of more than one size. And several agitator styles will handle specific mixing tasks. Your Hobart Mixer is adaptable to your needs.

We build them that way for you. Our reputation depends on it.



Hobart Mixers . . . Choice of the Foodservice and Baking Industry for Over a Half Century

MODEL N50

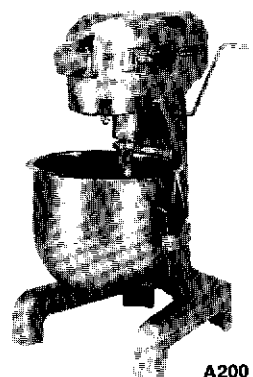
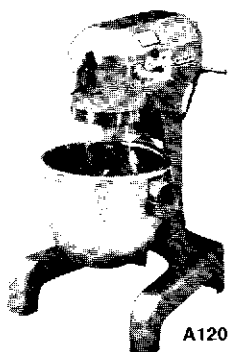
The model N50 (5 quart) mixer is used for either laboratory or test use—or for small kitchen requirements. It has the same planetary mixing used on larger Hobart commercial mixers. This model has a $\frac{1}{6}$ horsepower Hobart designed motor, a three speed transmission, and a No. 10 attachment hub. And the 5 quart size is just right for those small jobs.

MODEL A120

The model A120 (12 quart) mixer is a multi-purpose mixer for use in kitchen, bake shop, or lunchroom. This model has a $\frac{1}{3}$ horsepower Hobart built motor, a three speed transmission, planetary mixing, and a No. 12 attachment hub. Model A120 accommodates only 12 quart bowls. An optional 0-15 minute timer provides timed mixing control.

MODEL A200

The model A200 (20 quart) mixer has a $\frac{1}{2}$ horsepower Hobart built motor, three speed transmission, planetary mixing, and No. 12 attachment hub. It may be ordered as a bench model or as a floor model with an extended pedestal. This popular 20 quart mixer meets both kitchen and bake shop requirements. Most A200 mixers are equipped with the optional 0-15 minute timer. An optional Stir Switch makes it easy to add liquid ingredients to semisolids at a slow speed of 54 rpm. The A200 mixer can accommodate a standard 20 quart bowl, or an optional 12 quart bowl with no bowl adapter required. The A200 is available with a deluxe finish at extra cost. This unit is a valued addition to any preparation room and is even handier with an assortment of attachments.



MODEL D300

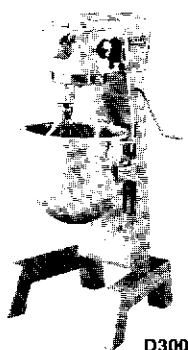
The D300 mixer (30 quart) has a dependable $\frac{3}{4}$ horsepower Hobart built motor, three speed transmission, planetary mixing and No. 12 attachment hub. The D300 stands on the floor and features a totally enclosed, sanitary design with air circulation within the pedestal for cooling the motor. The mixer's legs permit thorough floor cleanup. Most D300 mixers are equipped with the optional 0-15 minute timer. This mixer can accommodate a standard 30 quart bowl, or an optional 20 quart bowl when used with an optional bowl adapter. The D300 is available with a deluxe finish at extra cost.

MODEL H600

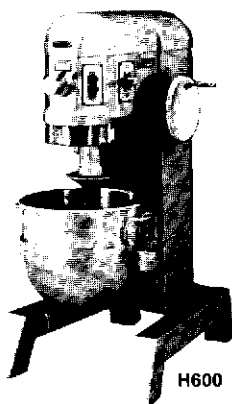
The popular H600 (60 quart) mixer has a dependable 2 horsepower Hobart built motor, four speed transmission, planetary mixing, 0-15 minute timer, and No. 12 attachment hub. This versatile model works well in a kitchen, pizza operation or full service retail bake shop. The H600 is internally ventilated to provide cooling for the motor. The mixer's legs permit thorough floor cleanup. This mixer can accommodate a standard 60 quart bowl, or an optional 40 or 30 quart bowl when used with an optional bowl adapter. An optional power bowl lift is available to raise and lower the mixer bowl by turning a lever. A deluxe finish is available at extra cost.

MODEL P660

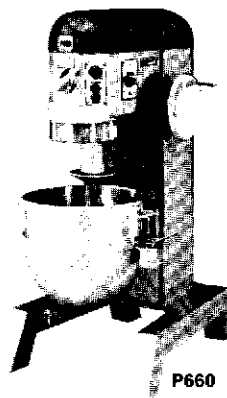
The model P660 (60 quart) pizza mixer is specifically designed to handle all phases of pizza preparation. The $2\frac{1}{2}$ horsepower Hobart built motor and lower gear ratios combine to give this mixer 50% more torque at the beater shaft than other 60 quart mixers. Other features include: thermal overload protection, two speed transmission, hand operated bowl lift, 0-15 minute timer and No. 12 attachment hub. The P660 is internally ventilated within the mixer enclosure to provide cooling for the motor. The mixer's legs permit thorough floor cleanup. This model can accommodate the standard 60 quart bowl, or an optional 40 or 30 quart bowl when used with optional bowl adapters. The P660 handles heavy pizza dough loads with ease, has 60 quart capacity and an attachment hub for everything that goes on top of your pizza.



D300



H600



P660

MODEL L800

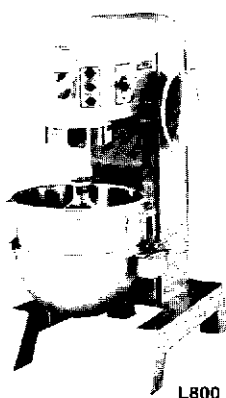
The model L800 (80 quart) mixer has a dependable 2 horsepower Hobart built motor, four speed transmission, planetary mixing, 0-15 minute timer, and No. 12 attachment hub. This versatile model works well in a general foodservice kitchen. The L800 is internally ventilated to provide cooling for the motor. The mixer's legs permit thorough floor cleanup. This mixer can accommodate a standard 80 quart bowl, or optional 30, 40, or 60 quart bowls when used with optional bowl adapters. An optional power bowl lift is available to raise and lower the mixer bowl by turning a lever. A deluxe finish is available at extra cost.

MODEL M802

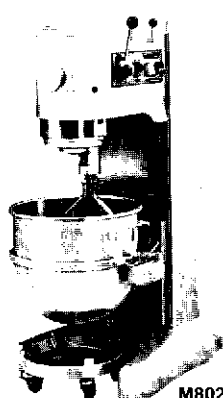
The model M802 (80 quart) mixer has a powerful 3 horsepower Hobart built motor, heavy duty four speed transmission and clutch, planetary mixing, power bowl lift, mixing light and 0-15 minute timer. This model is designed for heavy duty applications such as bakeries. The M802 is internally ventilated to provide cooling for the motor. This mixer can accommodate a standard 80 quart bowl, or optional 30, 40, or 60 quart bowls when used with optional bowl adapters. A No. 12 attachment hub is optional. The M802 may be ordered, at extra cost, with a 14" higher than standard column to allow removal of bowl without removing beater. A USDA approved finish is available at extra cost.

MODEL V1401

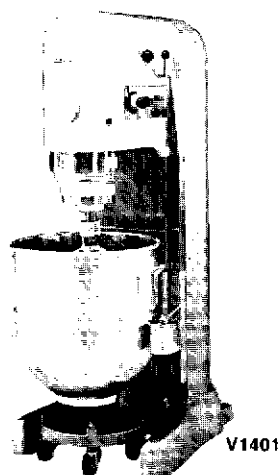
The model V1401 (140 quart) mixer has a powerful 5 horsepower Hobart built motor, heavy duty four speed transmission and clutch, planetary mixing, power bowl lift, mixing light and 0-15 minute timer. This model is designed for heavy duty applications such as bakeries. The V1401 is internally ventilated within the mixer enclosure to provide cooling for the motor. This mixer can accommodate a standard 140 quart bowl, or optional 30, 40, 60 or 80 quart bowls when used with optional bowl adapters. A No. 12 attachment hub is optional. The V1401 may be ordered, at extra cost, with a 17" higher than standard column to allow removal of bowl without removing beater. A USDA approved finish is available at extra cost.



L800



M802



V1401

Beaters, Whips, Dough Arms, Pastry Knives ... and How to Use Them

This section illustrates and names the various mixer agitators and discusses their applications. General information on how to get the best results from your Hobart mixer is also provided. As is always the case with the art of cooking, your best creations are achieved by carefully proving your methods and formulas and evaluating the results.

The discussions on mixer performance and agitator uses are similar for planetary action mixers regardless of size. That is not to say that the same mix times will apply. This handbook offers suggestions and guidelines only. The cooking is up to you.

Attachments and accessories and their uses are discussed in the last section of the handbook.

CLEANING NEW MIXER BOWLS AND AGITATORS

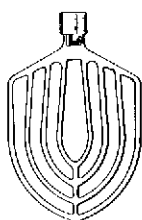
Before using the first time, thoroughly wash new mixer bowls and agitators (beaters, whips, dough arms and pastry knives). Wash in hot water and a mild detergent solution, rinse with either a mild soda or vinegar solution, and thoroughly rinse with clear water. Also follow this cleaning procedure for bowls and agitators before whipping egg whites or whole eggs.

Mixing granulated sugar, whole eggs or tomato products can cause the tinned surface of mixer bowls to wear off. Also, extremely coarse granulated sugar will cause darkening of the batch when mixed in a tinned bowl. See 'CAKES WITH A HIGH SUGAR CONTENT' on page 11. Many mixer users prefer to use stainless steel bowls for the above applications. Stainless steel bowls are available at extra cost.

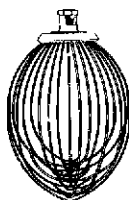
AGITATORS AND THEIR USES

Agitators are available for the different mixers and bowl sizes and for the type of product that is being mixed.

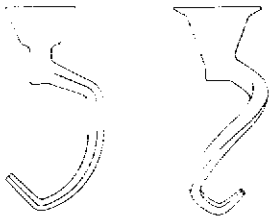
The B Flat Beater is a multi-purpose agitator used for mashing potatoes or other vegetables, and mixing cakes, batters or icings. It is also used in industrial applications for any product requiring a creaming or rubbing action and uniform dispersion of ingredients. Use first speed for starting most operations; medium speed for finishing.



The D Wire Whip is designed for maximum blending of air into light products. Uses include: whipping cream, beating egg whites, mixing very light icings and meringues, and all similar applications. The D Wire Whip is most commonly used in second and third speed on three speed mixers and third and fourth speed on four speed mixers.



The E and ED Dough Arms are used for mixing most bread, roll and pizza doughs which require folding and stretching action for best development. These agitators are suitable for use on all yeast raised doughs and should be operated in first or second speed on two speed and three speed mixers or the first, second, or third speed on four speed mixers. The E Dough Arm is used with 5 to 40 quart mixer bowls; and the ED Dough Arm is used with 60 to 140 quart mixer bowls. The ED Dough Arm has an extra contour which optimizes working of the dough in the larger sized bowls.

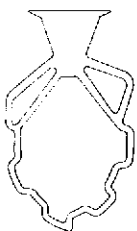


The C Wing Whip is used for whipping material that is too heavy for the D Wire Whip.

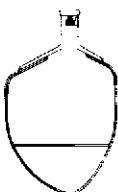
The heavy frame permits its use for light creaming and beating. It is often used for whipping or blending potatoes, butter, mayonnaise or light icings. It is generally used in first and second speed for whipping heavy products like potatoes or in third or fourth speed for light products like mayonnaise or icings. The C Wing Whip has four wings in 5, 12, 20, and 30 quart sizes and six wings in 40, 60, 80, and 140 quart sizes. The four wing whip is best for the smaller capacity bowls while the six wing whip optimizes mixing efficiency in the larger bowl sizes.



The S Sweet Dough Arm combines the action of the B Flat Beater and the ED Dough Arm and is used to mix sweet doughs like Danish pastry or other high sugar, high shortening, yeast raised doughs. It also is used for some creaming, folding, and stretching operations. It is used in first speed on a three speed mixer or in first or second speed on a four speed mixer.



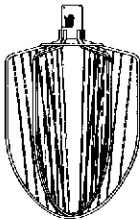
The P Pastry Knife combines shortening with flour, and is ideal for light pastry shells (pattie shells), flaky pie doughs, and similar mixes. The cutting action of the knife practically eliminates rubbing and allows delicate ingredients to be combined without overdevelopment. The P Pastry Knife is suitable for stirring operations in low speeds and for fast cutting operations in medium speeds. You should not use the P Pastry Knife at high speed if you want the pastry to have flaky texture.



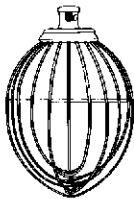
SPECIAL AGITATORS AND THEIR USES

Several special agitators are available for various applications.

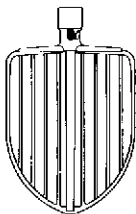
The CH Wing Whip mixes marshmallow and heavy icings at intermediate speeds. It is available only in the 140 quart size.



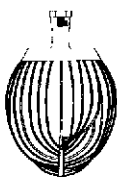
The I Wire Whip makes sponge cakes and mixes light marshmallow for heavy whipping. It is available in 30, 40, 60, 80, or 140 quart sizes.



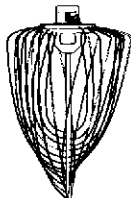
The J Wing Whip or Beater whips marshmallow and icings. This beater is made from tin plated bronze and is only used where bronze is permitted. It is available in 80 or 140 quart sizes.



The K Spiral Whip makes sponge cakes, incorporates flour, and mixes light marshmallow. It is available only in the 80 quart size.



The Q Spiral Whip is used for foaming of light batches at high speed and for quick blending of flour at low speed. It is available only in the 140 quart size.



FORMULAS AND METHODS

Use your own formula for any products you wish to make in your Hobart mixer. Then evaluate the finished product for texture, conformity, lightness, flakiness, etc. You will find that any method of blending ingredients can be duplicated or improved with your machine. A word of caution: **Do not overmix.** Overmixing can adversely affect the texture of your product. You will also discover there is often a saving in time for each mixing operation. Even delicate products usually mixed by hand can be mixed in your Hobart mixer.

Your Hobart mixer mixes your products in the most efficient and quickest way possible. There is no need for you to sacrifice individual characteristics when using your Hobart mixer. When results are exactly to your liking, note carefully the time of operation and the speed setting. Under the same conditions, your Hobart mixer will perform exactly the same, day after day, providing uniformity in your products.

MIXER CAPACITY

The Mixer Capacity Chart on page 14 is a guide for controlling the batch sizes in your formulations. The capacities listed take into account the amount of product which can be contained in the various sized bowls. The listed capacities are the maximum recommended batch sizes. Whenever batch size exceeds 50 pounds, use a bowl truck to load and unload the bowl from the mixer. Recipes for doughs used to establish the batch sizes in the Mixer Capacity Chart are listed below:

INGREDIENT	HEAVY BREAD DOUGH	MEDIUM PIZZA DOUGH	RAISED DONUT DOUGH
Flour	100.0%	100.0%	100.0%
Water	55.0	50.0	65.0
Yeast	2.0	1.0	5.0
Salt	2.5	1.5	2.5
Sugar	5.0	-0-	15.0
Shortening	5.0	-0-	15.0
Oil	-0-	2.0	-0-
Non-Fat Dry Milk	6.0	-0-	8.0
Total	175.5%	154.5%	210.5%

The ingredient percentages are based on a flour content of 100 percent to simplify using the recipes to make various sized batches and compute the moisture absorption ratio. The heavy bread dough recipe above is a criterion listed in Section 4.4.2 of Federal Specification 00-M-0038K, Standard for Electric Food Mixing Machines.

The flour used in the recipes is hard wheat flour, enriched and bleached. It contains 11 to 12 percent protein content and a 12 percent moisture content. Flour which has a lower moisture content will decrease the moisture absorption, cause difficulty in proper gluten hydration, and make a heavier load on your mixer. Flours containing high quality protein, such as high gluten flour, result in a dough which can be very difficult to mix. If high gluten flour is used, reduce the batch quantity noted on the Mixer Capacity Chart by 10 percent to prevent overloading of the mixer.

The temperature of the water used in the recipes is 65-75° F. Colder water temperature will cause the dough to be harder to mix. If you plan to mix doughs using cold water, the batch size may need to be reduced.

Also considered and noted on the Mixer Capacity Chart is the moisture absorption ratio (AR). This is the ratio of the weight of water to the weight of flour expressed as a percentage.

$$AR = \text{weight of water} \div \text{weight of flour} \times 100\%$$

The absorption ratio gives an indication of the relative “heaviness” or “wetness” of a batch. In fact, the capacities listed on the Mixer Capacity Chart for the products listed below are based on the following absorption ratios:

PRODUCT	ABSORPTION RATIO
Heavy Bread Dough	55%
Medium Bread Dough	60%
Light Bread Dough	65%
Thin Pizza Dough	40%
Medium Pizza Dough	50%
Thick Pizza Dough	60%
Raised Donut Dough	65%
Whole Wheat Dough	70%

When mixing any of the above products with an absorption ratio lower than listed, decrease the batch size proportionately to assure efficient mixing of the product and thus eliminate the possibility of overloading your mixer. For example: An H 600 mixer has a thin pizza dough capacity of 40 pounds at first speed based on an AR of 40% according to the Mixer Capacity Chart on page 14. If the batch has an AR of 30%, reduce the batch size to compensate for the difference. Compute the size of the reduction as follows:

1. Divide the AR of the batch to be mixed by the AR listed on the Mixer Capacity Chart.

$$\frac{30\% \text{ Actual AR}}{40\% \text{ Rated AR}} = 75\%$$
2. Multiply the rated batch size by the percentage obtained in step 1. The result is the maximum batch size of the H600 mixer for pizza dough with 30% AR.

$$\begin{array}{r} 40 \text{ lbs. Rated Batch Size} \\ \times 75\% \\ \hline 30 \text{ lbs. Maximum Capacity} \\ \text{for 30\% AR dough} \end{array}$$

Another factor often overlooked is the ability of your mixer to operate at a different speed. To prevent overloading, use the recommended mix speed from the Mixer Capacity Chart. Because of the toughness of a 40% AR thin pizza dough, a maximum mix time of 5 minutes on first speed is recommended. Second speed should never be used on 50% AR or lower products except on models P660, M802 or V1401. To mix 50% AR or lower doughs on second speed on models M802 or V1401, reduce batch size by 50 percent.

The speed of the mixer, length of mix time, room temperature and ingredient temperatures all affect dough temperature. To achieve the desired final dough temperature, you may need to adjust the water temperature.

For batch size capacities on other bread doughs not mentioned on the Mixer Capacity Chart, follow the batch size recommendation for a listed bread dough with a similar absorption ratio.

CREAMING OR RUBBING WITH THE B FLAT BEATER

When making cakes or similar products, the first step is normally rubbing or creaming the shortening. Start this work on first speed and complete it on second speed. If a very light consistency is desired, it may be beaten on third speed before adding more ingredients.

In most formulas, the second step is adding sugar. Most operators prefer to add sugar slowly while the mixer is operating in second speed on a three speed mixer or second or third speed on a four speed mixer. If you wish to add the sugar all at one time, complete the creaming of the shortening and then stop the machine. When adding the sugar, place it toward the center of the bowl. Start the machine in first speed for the first few turns around the bowl, then increase the speed to complete the operation. After all the sugar has been added, you may want to scrape down the bowl. To scrape the bowl, first stop the mixer. After the beater has stopped, scrape down the sides of the bowl with a bowl scraper or spatula. This returns to the mixture any material which may have accumulated on the bowl sides above the beater shoulder. After scraping down the material, restart the mixer. Beat until smooth using second speed on a three speed mixer or third speed on a four speed mixer. **Do not overmix.**

CAKES WITH A HIGH SUGAR CONTENT

To help avoid darkening of light cake batters with a high sugar content when using a tinned bowl, add whole eggs gradually to the batch before beating is complete. Do not add the total amount of whole eggs to the batch at one time.

Darkening of the butter and sugar mix can also result if:

- You add the sugar before the shortening is creamed,
- You add the sugar too quickly to the creamed shortening, or
- You add more sugar than the creamed base can absorb.

When mixing whole eggs, it is unnecessary to separate the whites from the yolks. Add the eggs slowly and allow them to become thoroughly incorporated into the shortening base.

Flour and any leavening agent, such as baking powder, soda or special combinations of dry ingredients, may be sifted together. When incorporating dry ingredients, stop the mixer (wait for the beater to stop), scrape down the bowl if necessary, and then add about $\frac{1}{3}$ of the flour and a portion of the milk or added moisture in any form. Resume mixing in first speed. When the flour is incorporated, add half of the remaining liquid and flour. When this is blended, add the remaining liquid and flour. Caution: Use only first speed on either a three or four speed mixer while adding flour. If necessary, start and stop the mixer by using the switch or clutch lever during incorporation of the flour. This prevents raw flour from being thrown out of the mixer and avoids toughening of the mix by overmixing.

Exercise caution not to overmix the batch during or after the addition of the flour. Usually, by the time the flour is thoroughly incorporated, the mix is completed. Further beating is of no benefit and may cause toughening of the product. The time for beating and creaming is before adding the flour. After the flour and final moisture is added, do as little mixing as possible.



WHIPPING

Use either the D Wire Whip or the C Wing Whip for whipping operations. Although some special operations require other adaptations of the same general type of agitator, our discussion centers on the D Wire Whip and the C Wing Whip.

The D Wire Whip (sometimes called balloon or cage whip) is recommended for whipping cream. With today's marketing conditions, most raw or fresh cream whips well. All cream should be at least 36 to 48 hours old, and should be sufficiently high in butterfat to allow the air to be introduced by whipping. Cream should be cold, but not so cold that ice crystals are formed. When cream is too warm, it turns to butter when whipped. Start the mixer in first speed and gradually increase the speed finishing on third or fourth. The amount of total whipping will depend on the condition, temperature and butterfat content of the cream and the type of product being prepared. An experienced operator will recognize the point of greatest firmness or stiffness in the whipped product. A word of caution: Since small diameter wires are used to obtain good whipping, they can break if used to mix heavy product or if the whip is rapped on the side of the bowl to remove excess product.

The C Wing Whip may be used for cream whipping, but it is somewhat slower in operation. One of its principal uses in the kitchen is for whipping potatoes. Of course, whipped potatoes are cooked and then whipped while hot. The potatoes must be soft enough to break up easily by the action of the C Wing Whip in low speed. They may then be finished in second or third speed on a three speed mixer. It is not advisable to whip potatoes in fourth speed on a four speed mixer without using a splash cover. If other ingredients (hot milk, butter or other enriching material) are added, use low speed. The C Wing Whip is excellent for whipping butter.

The C Wing Whip may also be used for mixing salad dressing and light mayonnaise. Since it is an aerating type whip, it reaches its greatest efficiency at the higher speeds.

The D Wire Whip is generally used for eggs. When you whip only egg whites, begin in first speed. When the material begins to expand, progress to second speed. Due to the expansion of the product from the incorporation of air, bowl capacity is limited by the volume of the final product, not by the amount of liquid ingredients at the beginning.

When egg whites are whipped, they are generally finished in high speed on either a three or four speed mixer. When adding sugar to make a meringue, add the sugar at slow speed and then whip briefly in second speed on a three speed mixer or third speed on a four speed mixer.

Over-whipping will result in a refining action which liberates air. Stop the mixer as soon as a dry-appearing peak is reached.

Caution: When whipping eggs, either whites or whole eggs, it is important to have the bowl and the agitator completely free of any trace of shortening or other oily material. The slightest amount of fat will prevent proper incorporation of air. (See 'Cleaning New Mixer Bowls and Agitators' on page 6. In some kitchens and bakeries, it has become general practice to keep certain bowls only for this purpose.

You may also use the C Wing Whip for whipping eggs or egg whites. However, the results are somewhat slower than produced by the D Wire Whip.

MAYONNAISE MAKING

The C Wing Whip, because of its strength, high efficiency, and durability when used on larger mixers, is most commonly used for making mayonnaise. However, the D Wire Whip may be preferred when making very light batches or when using smaller bowls (5 to 30 quart).

When you do not need a high emulsion, you may use the B Flat Beater. The B Flat Beater may be used for French or other thin types of salad dressings. The C Wing Whip can also provide satisfactory results by operating the machine at a slow speed.

Because of the great variation in types of mayonnaise and a still wider range of salad dressings known under other names, we will not supply a specific mayonnaise formula. All formulas, however, require the introduction of liquid ingredients, the most important of which is vegetable oil. This may be corn oil, peanut oil, soybean oil, palm oil, safflower oil or several others. You must add the oil slowly, and the operator must pay close attention.

When making mayonnaise, eggs are first thoroughly whipped, then spices, flavoring or other ingredients are added at slow speed. These may have been previously mixed together, perhaps with a portion of vinegar or other mild acid. After blending these ingredients, the mixer may be operated in third speed (or fourth). Add the oil very slowly over an interval of 10 to 20 minutes. Add vinegar or vinegar and water toward the end of the interval when oil can be added. You may wish to stop the mixer (wait for beater to stop), then scrape the sides of the bowl to return any splashed materials to the batch. Start the mixer on slow speed, then advance to medium for a short period of mixing.

The times given are approximate and not based on any particular formula. However, do not continue beating or mixing after adding the last of the vinegar.

Mixer Capacity Chart — All Models

Recommended Maximum Capacities — dough capacities based on 70°F water and 12% flour moisture.

PRODUCT	AGITATORS SUITABLE FOR OPERATION	N50	A120	A200	D300	H600	P660	L800	M802	V1401
CAPACITY OF BOWL (QTS. LIQUID)		5	12	20	30	60	60	80	80	140
CAPACITIES — SINGLE BATCHES										
Egg Whites	D	½ pt.	1¼ pt.	1 qt.	1½ qts.	2 qts.	—	2 qts.	2 qts.	4 qts.
Mashed Potatoes	B & C	3 lbs.	10 lbs.	15 lbs.	23 lbs.	40 lbs.	—	50 lbs.	60 lbs.	100 lbs.
Mayonnaise (Qts. of Oil)	B or C or D	1½ qts.	4½ qts.	10 qts.	12 qts.	18 qts.	—	22 qts.	30 qts.	50 qts.
Meringue (Qty. of Water)	D	¼ pt.	¾ pt.	1½ pts.	1 qt.	1½ qts.	—	3 qts.	3 qts.	5 qts.
Waffle or Hot Cake Batter	B	2 qts.	5 qts.	8 qts.	12 qts.	24 qts.	—	30 qts.	32 qts.	—
Whipped Cream	D or C	3 pts.	2½ qts.	4 qts.	6 qts.	12 qts.	—	16 qts.	16 qts.	30 qts.
CAPACITIES — SINGLE BATCHES										
Cake, Angel Food (8-10 oz. cake)	C or I	2	7	15	22	45	—	60	60	120
Cake, Box or Slab	B or C	4 lbs.	12 lbs.	20 lbs.	30 lbs.	50 lbs.	75 lbs.	80 lbs.	100 lbs.	185 lbs.
Cake, Cup	B or C	5 dz.	12 dz.	22 dz.	33 dz.	70 dz.	85 dz.	90 dz.	125 dz.	235 dz.
Cake, Layer	B or C	3 lbs.	12 lbs.	20 lbs.	30 lbs.	60 lbs.	70 lbs.	80 lbs.	90 lbs.	165 lbs.
Cake, Pound	B	3 lbs.	12 lbs.	21 lbs.	30 lbs.	55 lbs.	75 lbs.	80 lbs.	100 lbs.	185 lbs.
Cake, Short (Sponge)	C or I	3 lbs.	8 lbs.	15 lbs.	23 lbs.	45 lbs.	—	70 lbs.	80 lbs.	150 lbs.
Cake, Sponge	C or I	2 lbs.	6½ lbs.	12 lbs.	18 lbs.	36 lbs.	—	54 lbs.	65 lbs.	140 lbs.
Cookies, Sugar	B	8 dz.	20 dz.	35 dz.	50 dz.	100 dz.	100 dz.	115 dz.	125 dz.	225 dz.
Dough, Bread or Roll (Li-Med.) 60% AR §	ED	4 lbs.	13 lbs.	25 lbs. □	45 lbs. □	80 lbs. *	90 lbs. *	80 lbs. *	170 lbs. *	210 lbs. *
Dough, Heavy Bread §	ED	—	—	15 lbs. □	30 lbs. □	60 lbs. *	85 lbs. *	60 lbs. *	140 lbs. *	175 lbs. *
Dough, Pie	B & P	3 lbs.	11 lbs.	18 lbs.	27 lbs.	50 lbs.	60 lbs.	60 lbs.	75 lbs.	125 lbs.
Dough, Thin Pizza 40% AR (max. mix time 5 min.) §†	ED	—	—	9 lbs. □	14 lbs. □	40 lbs. □	60 / 40* lbs.	40 lbs. □	85 lbs. □	135 lbs. □
Dough, Med. Pizza 50% AR §†	ED	—	—	10 lbs. □	20 lbs. □	70 lbs. □	90 / 70* lbs.	70 lbs. □	155 lbs. □	190 lbs. □
Dough, Thick Pizza 60% AR §†	ED	—	—	20 lbs. □	40 lbs. □	70 lbs. *	90 lbs. *	70 lbs. *	155 lbs. *	190 lbs. *
Dough, Raised Donut 65% AR	ED	—	—	9 lbs. *	15 lbs. *	30 lbs. †	75 lbs. *	40 lbs. †	60 lbs. †	100 lbs. †
Dough, Whole Wheat 70% AR	ED	—	—	20 lbs.	40 lbs.	70 lbs.	90 lbs. *	70 lbs.	150 lbs. *	185 lbs.
Eggs & Sugar for Sponge Cake	B & C or I	2 lbs.	5 lbs.	8 lbs.	12 lbs.	24 lbs.	—	36 lbs.	40 lbs.	75 lbs.
Icing, Fondant	B	2 lbs.	7 lbs.	12 lbs.	18 lbs.	36 lbs.	—	45 lbs.	65 lbs.	100 lbs.
Icing, Marshmallow	C or J or I	½ lb.	1¼ lbs.	2 lbs.	3 lbs.	5 lbs.	—	6½ lbs.	10 lbs.	20 lbs.
Shortening & Sugar, Creamed	B	3 lbs.	9½ lbs.	16 lbs.	24 lbs.	48 lbs.	50 lbs.	55 lbs.	65 lbs.	120 lbs.
Pasta, Basic Egg Noodle (max. mix time 5 min.)	ED	—	—	5 lbs.	8 lbs.	30 lbs.	40 lbs. □	30 lbs.	65 lbs. * □	100 lbs. *

□ 1st SPEED

* 2nd SPEED

† 3rd SPEED

§ If high gluten flour is used reduce above dough batch size by 10%

† 2nd speed should never be used on 50% AR or lower products with the exception of the P660, M802 & V1401. The M802 & V1401 require a 50% reduction in batch size to mix in speed 2 with 50% or less AR doughs

* This application may require an extended column.

NOTE: %AR (% Absorption Ratio) — Water weight divided by flour weight. Capacity depends on moisture content of dough. Above capacities based on 12% flour moisture at 70°F water temperature

ABBREVIATIONS — AGITATORS SUITABLE FOR OPERATION

B — Flat Beater

C — Wing Whip (4-Wing: 12 thru 30 qt., 6-Wing: 40 thru 140 qt.)

D — Wire Whip

ED — Dough Arm (20 thru 140 qt.)

I — Heavy Duty Wire Whip (30 qt. thru 140 qt.)

J — 4-Wing Beater (80 qt. thru 140 qt.)

P — Pastry Knife

Attachments and Accessories

Several valuable time and labor saving attachments and accessories are available for use with Hobart mixers. These tools will extend your usage of the mixer and enhance your operation by efficiently producing additional consistent, uniform products.

9" VEGETABLE SLICER

The 9" Vegetable Slicer attachment allows you to prepare many additional foods with your Hobart mixer. The standard knife and shaft is adjustable to provide variation in slice thickness from a maximum of about $\frac{5}{8}$ " to wafer thin. Thicker settings are used for slicing vegetables for salads or cole slaw, slicing potatoes for German (cottage fries) or American fried potatoes, slicing cucumbers, bananas, nuts, apples etc.

The 9"VS is easily adapted for grating or shredding processes by removing the knife and shaft and using the shaft with the wheel, called a plate holder. One grater plate and four shredder plates (with hole sizes of $\frac{3}{32}$ ", $\frac{3}{16}$ ", $\frac{5}{16}$ ", and $\frac{1}{2}$ ") are used for fine grating or fine to coarse shredding. The most coarse shredder plate ($\frac{1}{2}$ ") is used for slaw, cutting soup stock, salad blends, or hash brown potatoes. Experience with the unit will suggest many other products to the operator. The medium and fine shredder plates are for finer cuts on carrots, mushrooms, or cabbage hearts for salad or quick cooking uses. Medium shredder plates are also used for shredding processed cheese for a topping when desired. The grater plate is used for natural hard cheeses for pizza, grating hard vegetables, spices, and crumbing dried bread.

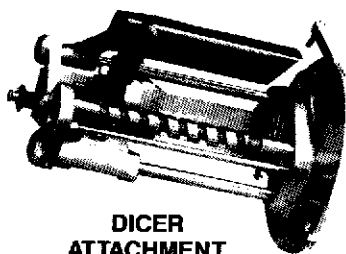
In addition to the standard hopper front, we make a tubular front for slicing softer materials or for making straight cuts. Chilled pepperoni is uniformly sliced with the tubular front.

Many different products can be prepared with the 9" Vegetable Slicer — in kitchens, bakeries or delicatessen operations. As a mixer attachment, the vegetable slicer should operate at second or third speed on Hobart planetary mixers. Operation in fourth speed is not recommended.

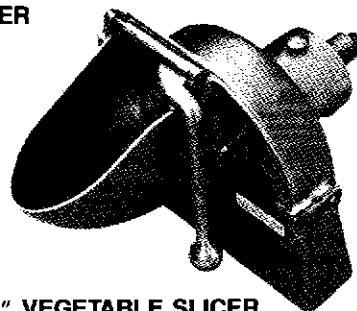
The 9"VS easily disassembles for cleaning.



SHREDDER AND GRATER
PLATES 9" VS



DICER
ATTACHMENT



9" VEGETABLE SLICER

POWER DICER ATTACHMENT

The Power Dicer attaches to all No. 12 attachment hubs and may be operated in first, second or third speed on Hobart planetary mixers. This versatile attachment puts labor costs at a minimum. The Power Dicer dices potatoes, onions, apples, carrots, beets, turnips, celery, cucumbers, cheese, and other vegetables with ease and speed. Cutting frames are available which will dice foods into uniform cubes of $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ ", and 1" sizes.

The Power Dicer easily cuts French fries, carrot sticks or celery strips. Simply remove the knife and insert a drive unit and a deflector.

The Power Dicer easily disassembles for cleaning.

SPEED DRIVE

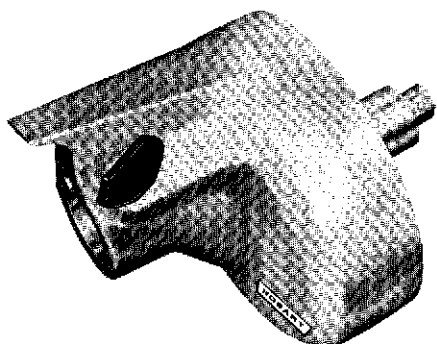
Use the Speed Drive Attachment to triple the speed of the 9" Vegetable Slicer, making slicing and shredding a faster, easier operation. The Speed Drive reduces the arm and hand pressure required to feed product through the Vegetable Slicer.

The Speed Drive fits into the No. 12 attachment hub on Hobart planetary mixers, food cutters and small choppers. Do not operate the Speed Drive with an output speed in excess of 850 R.P.M. High speeds on P660, H600, and L800 should not be used with the Speed Drive nor should third or fourth speeds on M802 or V1401. **Do not** use Power Dicer or Meat Chopper attachments with the Speed Drive. Speed Drive is easily cleaned by wiping with a damp cloth. **Do not** immerse Speed Drive in water.

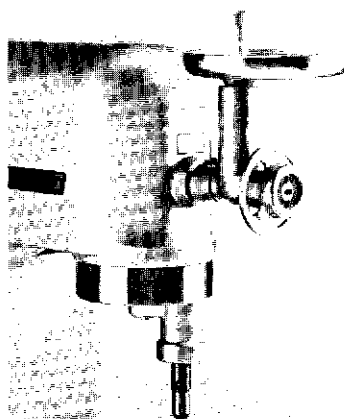
MEAT CHOPPER ATTACHMENT

The Meat Chopper Attachment allows you to prepare many additional foods with your Hobart mixer. A plate having $\frac{1}{8}$ " holes comes with the Meat Chopper Attachment when shipped from the factory. Other plates are available with hole sizes of $\frac{5}{64}$ ", $\frac{3}{16}$ ", $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{5}{8}$ " and $1\frac{1}{16}$ " for fine to coarse chopping. The results are the same as produced by Hobart commercial meat choppers. Operate Meat Chopper Attachments in first or second speed on N50, A120, and A200 mixers. Operate Meat Chopper Attachments in second or third speeds on D300, H600, and L800 mixers. Operate Meat Chopper Attachments in only second speed with M802 and V1401 mixers and in only first speed with P660 mixers.

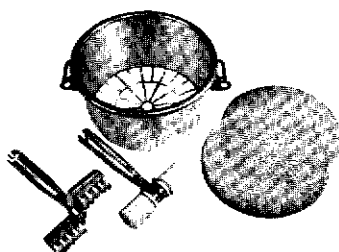
The feed pan should be kept in place in the cylinder for ease of feeding. Cut meat into strips and feed it into the chopper using the feed stomper only as needed. If the strips are cut to proper size, they will feed without using the feed stomper, freeing both of the operator's hands. Substances that could become packed tight in the chopper like **bread crumbs are not recommended**. If material in the cylinder stalls the mixer, push the STOP button at once. **DO NOT** attempt to restart at a slower speed. Remove the adjusting ring, knife, plate and worm and clear the obstruction.



SPEED DRIVE



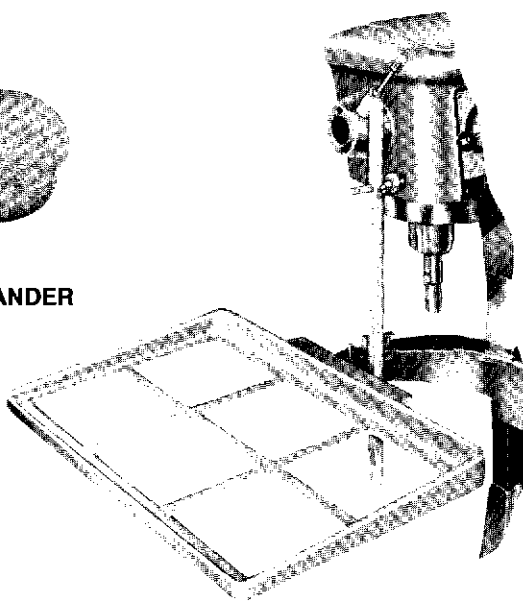
MEAT & FOOD CHOPPER



SOUP STRAINER/COLANDER



BOWL JACKET



ATTACHMENT TRAY SUPPORT

ATTACHMENT TRAY SUPPORT

Use the Attachment Tray Support with other Hobart attachments to provide a convenient, adjustable height platform for receiving pans. It fits all floor model Hobart mixers equipped with attachment hubs.

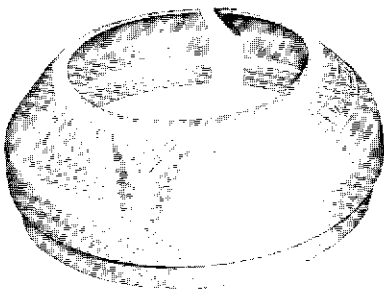
SOUP STRAINER/COLANDER

The Soup Strainer/Colander Attachment is available in four sizes; one to fit any mixer from 12 to 140 quarts. Use the Soup Strainer/Colander Attachment for making purees, ricing of potatoes or other vegetables, rolling, pressing and pitting of foods used for jams, jellies or flavorings, and a variety of other uses. Insert the colander bowl in place of the mixer bowl and the colander shank with roller or brush assembly in place of the mixer agitator. The roller or brush assembly exerts pressure on the colander screen by contact with the screen. Use the roller assembly for ricing potatoes, making fine or coarse soup stock including purees, and for any light pressure operation that does not involve pits or seeds as found in prunes, cherries, and plums. Use the brush assembly for processing foods with pits or seeds through the Soup Strainer/Colander.

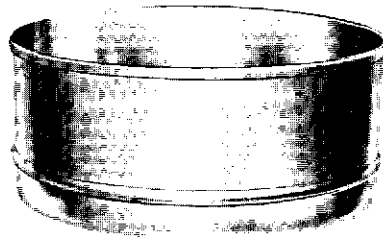
Screens with different hole sizes are available for the Soup Strainer/Colander attachments. The screens mount in the bottom of the colander bowl supported by a reinforcing frame. The screens are efficient to operate, easy to assemble and clean, and moderate in cost.

BOWL JACKET OR RECEIVING PAN

Use this accessory as a receptacle beneath the Hobart Soup Strainer/Colander on all but 5 and 140 quart mixers. Also, you may use it as a cooling or warming jacket for mixing bowls.



BOWL SPLASH COVER



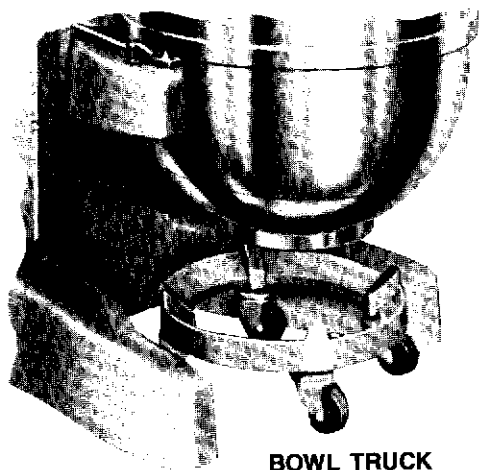
BOWL EXTENSION RING

SPLASH COVER AND BOWL EXTENSION

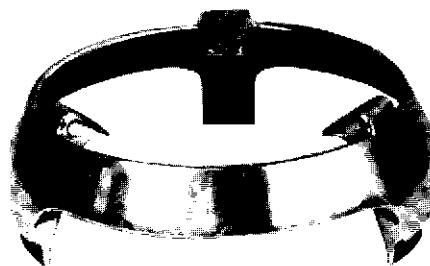
Splash Covers and Bowl Extensions are the same part on 30 quart and smaller Hobart mixers. They provide a means for reducing splashing for certain mixes at higher speeds.

Splash Covers and Bowl Extensions, while convenient accessories, **should not** be used to increase the mixing capacity beyond the recommended maximum. The best functioning of Hobart mixers requires room at the top of the bowl for aeration and manipulation. The true capacity of a mixer is not the amount of material that can be put in the bowl. Nor is it the batch size that may be mixed by the power of the motor. The true capacity and the most efficient operation is the ideal load which permits a mixer to operate at peak efficiency.

Splash Covers on larger mixers have a smaller diameter opening at the top due to their inverted cone shape. Overloading the mixer while a splash cover is in use reduces aeration because of restriction in the area where air enters the batch. Capacity charts are an excellent guide for maximum efficient use of the mixer. However, your own experience will dictate the proper capacities and the need for splash covers and bowl extensions.



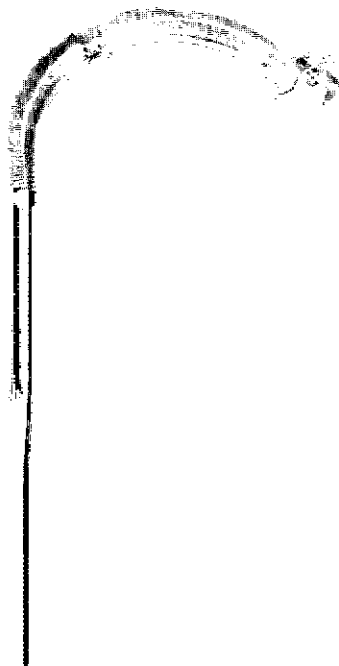
BOWL TRUCK



BOWL TRUCK ADAPTER

BOWL TRUCK

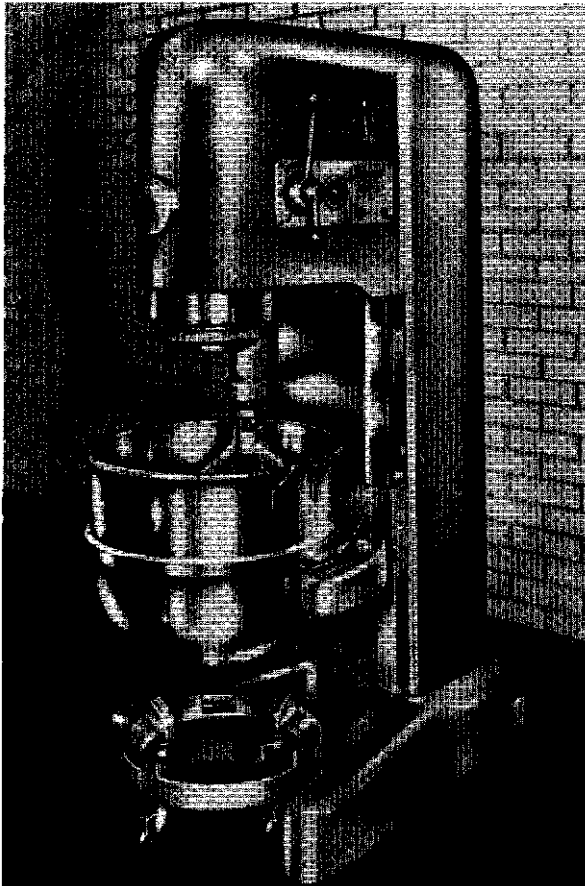
Bowl Trucks or dollies provide convenience, save time, and reduce effort in handling large batches. Use a Bowl Truck for any batches over 50 pounds. Bowl Trucks are available for all floor model Hobart planetary mixers. Any 60, 80, or 140 quart bowl may use the same truck. However, you need to use a Bowl Truck Adapter when using 30 or 40 quart bowls on the larger mixers. This extends the usefulness of Bowl Trucks in an operation using several sizes of floor model Hobart planetary mixers. Remove heavy batches of dough or batter from the mixer by opening the bowl clamps and lowering the bowl to the Bowl Truck. Then, carefully roll the truck away to make room for the next batch. Move the material to another location where it is to be used, or refrigerate between mixing and further processing. Bowl Trucks save time, reduce handling, and improve throughput. They are valuable tools in a work place.





Model No. _____
Serial No. _____

Hobart Service Location _____
Telephone Number: _____



MODEL M-802 MIXER MODEL V-1401 MIXER

WARNING

This Manual is prepared for the use of trained Hobart Service Technicians and should not be used by those not properly qualified, nor should the equipment for which it is prepared be adjusted or repaired by anyone except properly qualified personnel. Reproduction of this Manual is prohibited without the written consent of Hobart Corporation.

INDEX

Section 1. General	4
Section 2. Specifications	4
1. Motors	4
2. Electrical Specifications	4
3. Operating Speeds.....	4
4. Over-all Dimensions	4
5. Net Weight	4
Section 3. Installation	5
Section 4. Operating Instructions	5
1. Operating Controls	5
Section 5. Cleaning	6
Section 6. Lubrication	6
1. Transmission	7
2. Planetary	7
3. Bowl Lift Gear Case	8
4. Bowl Lift Screw Assembly	8
5. Slideways	8
6. Motor	8
Section 7. Adjustments	9
1. Bowl to Beater Clearance	9
2. Bowl Clamp Adjustment	10
3. Slideways	10
4. Bowl Lift "V" Belt	10
5. Clutch Adjustment	11
6. Brake Adjustment	13
7. Flexa-Gear	14
Section 8. Motor	15
1. Flexa-Gear Drive	15
2. Servicing Single Phase Starting Components	16
3. Removing the Motor (Solid State Controls)	17
4. Removing the Motor (Non Solid State Controls)	18
5. Motor Disassembly	19
6. Motor Reassembly	19
7. Installing the Motor (Solid State Controls)	19
8. Installing the Motor (Non Solid State Controls)	20
9. Motor Cooling System	20
Section 9. Clutch and Brake	21
1. Brake	21
2. Clutch	22
Section 10. Planetary	28
1. Agitator Shaft Pin Replacement	28
2. Removal of the Planetary	28
3. Agitator Shaft Removal	29
4. Installing the Agitator Shaft	31
5. Planetary Upper Extension	32
6. Planetary Oil Pump	32
7. Internal Gear	33
8. Installing the Planetary	33

Section 11. Transmission	35
1. Disassembling the Transmission	35
2. Main Drive Shaft Disassembly	38
3. Main Drive Shaft Assembly	38
4. Clutch Shaft Disassembly	39
5. Clutch Shaft Assembly	39
6. Planetary Shaft Disassembly	40
7. Planetary Shaft Assembly	40
8. Speed Selector Disassembly	41
9. Assembly	41
10. Shifting Yoke	42
11. Oil Pump	42
12. Attachment Hub (Optional)	43
13. Assembling the Transmission	43
14. Power Flow	46
Section 12. Power Bowl Lift	48
1. "V" Belt Replacement	48
2. Overload Slip Clutch	48
3. Bowl Lift Gear Box	49
4. Bowl Lift Screw Extension	51
5. Bowl Lift Screw	52
6. Bowl Support	53
Section 13. Transmission Housing, Pedestal, Base	54
1. Transmission Housing	54
2. Pedestal	54
3. Base	54
Section 14. Electrical Controls (Solid State)	55
1. Operating Controls	55
2. Electrical Service Connection	55
3. Motor Contactor	55
4. Motor	56
5. Fuse Board	56
6. Transformer and Power Input Board Assembly	56
7. Motor Protector Board	57
8. Electrical Sequence of Operation	58
9. Electrical Troubleshooting	58
Section 15. Electrical Controls (Non Solid State)	60
1. Operating Controls	60
2. Electrical Service Connection	60
3. Motor Contactor	61
4. Motor	61
5. Transformer	61
6. Sequence of Operation	61
7. Electrical Troubleshooting	64
Section 16. Testing	64
1. Testing the Transformer (Solid State Mixer)	64
2. Testing Motor Current	65
3. Testing Motor Field Windings	66
4. Testing the Motor Protector Circuit (Solid State Mixer)	68

SECTION 1 GENERAL

The Hobart M-802 and V-1401 mixers are designed primarily to mix food products. However, they are used for various industrial applications.

An optional attachment hub provides versatility of operation through the use of optional attachments and accessories.

Both the attachment hub and the planetary are driven by the four speed transmission. A timer (15 minute) and a brake are standard equipment on these heavy duty mixers as is the power bowl lift system. An optional timer (30 or 60 minute) is also available.

An optional taller pedestal (14" on the M-802 and 17" on the V-1401) is an operational advantage as it allows removal of the bowl without removing the agitator.

SECTION 2 SPECIFICATIONS

1. Motors.

A. M-802

3 hp, fan cooled, 1725 RPM (Solid State Mixer).

2 hp, fan cooled, 1725 RPM (Non Solid State Mixer).

B. V-1401

5 hp, fan cooled, 1725 RPM.

2. Electrical Specifications.

200 volts, 60 Hz., 1 phase

230 volts, 60 Hz., 1 phase

220 volts, 50 Hz., 1 phase

200 volts, 60 Hz., 3 phase

230 volts, 60 Hz., 3 phase

460 volts, 60 Hz., 3 phase

220 volts, 50 Hz., 3 phase

380 volts, 50 Hz., 3 phase

415 volts, 50 Hz., 3 phase

3. Operating Speeds.

A. M-802

SPEED	AGITATOR	ATTACHMENT
First	55	102
Second	96	179
Third	181	336
Fourth	318	591

B. V-1401

SPEED	AGITATOR	ATTACHMENT
First	46	85
Second	80	149
Third	150	280
Fourth	265	494

4. Over-all Dimensions with Standard Bowl.

A. M-802

Height	65-1/8"
Width	27-1/4"
Depth	42-5/8"

B. V-1401

Height	71-3/8"
Width	29-1/4"
Depth	45-3/8"

5. Net Weight, including Bowl, Beater and Whip.

MODEL	NET WT.
M-802	1150 lbs.
V-1401	1548 lbs.

SECTION 3 INSTALLATION

Detailed installation instructions are included in the "Instruction Manual with Replacement Parts" attached to each new machine. For installation instructions, refer to that manual.

SECTION 4 OPERATING INSTRUCTIONS

1. Operating Controls.

- A. The Bowl Clamps (1, Fig. 4-1) are used to lock the bowl in position on the bowl support.
- B. The Bowl Lift Handle (2, Fig. 4-1) is used to automatically raise and lower the bowl support. The slip clutch on the power bowl lift will ratchet at the top and bottom stop positions to signal end of travel and to protect the operating mechanism.
- C. The Gear Shift Handle (3, Fig. 4-1) is used to select the desired operating speed. Speed selection must be made **WITH THE CLUTCH DIS-ENGAGED**.
 - (1) The number "1" (LOW) speed is for heavy mixtures like dough, heavy batters and potatoes.
 - (2) The number "2" (MEDIUM-LOW) speed is for mixing cake batters, mashing potatoes and developing bread doughs.
 - (3) The number "3" (MEDIUM-HIGH) speed is for egg whites, whipping cream, light icing and meringues.
 - (4) The number "4" (HIGH) speed is used for products as in 3rd speed but at an accelerated rate.
- D. The Clutch Handle (4, Fig. 4-1) is used to engage the transmission after the speed has been selected.

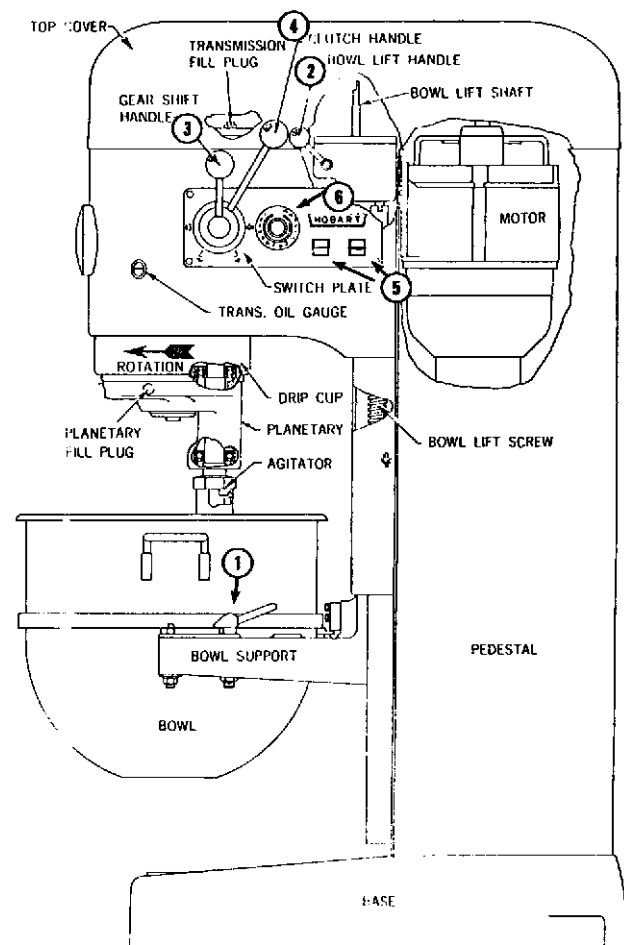


Fig. 4-1

- E. The Start and Stop switches (5, Fig. 4-1) are used to start and stop the motor by pressing on the appropriate button.
 - F. The Timer (6, Fig. 4-1) can be set to automatically control the mixing time up to 15 minutes (30 and 60 minute timers are optional). When setting time, turn past 3 and then set the time. For non-timed operation, turn the timer knob counterclockwise to the HOLD position and press the start button. A mechanical stop prevents the timer from being moved clockwise past the maximum time setting to HOLD.
- 2. For detailed information concerning bowls, agitators, attachments and accessories, refer to the "Use And Application Handbook for Hobart Mixer Agitators, Attachments and Accessories" Form 13370.

SECTION 5 CLEANING

Detailed cleaning instructions are included in the "Instruction Manual with Replacement Parts" attached to each new machine.

SECTION 6 LUBRICATION

LUBRICATION CHART

Transmission:	Gearep #140	128 oz.
Planetary:	Gearep #85	6 oz.
Motor Bearings:	Pre-Lubricated	
Slideways:	Havoline #10	Lightly coat
Bowl Lift Gear Box:	Marfak MP-2	16 oz.
Bowl Lift Screw:	Lubriplate 630AA	Coat

1. Transmission.

The oil level should be level with the oil level gauge line (1, Fig. 6-1) while the mixer is off.

Change the oil every 3 years or more frequently with heavy usage.

Take precautions to make sure the new oil remains clean and free of contaminants.

CAUTION: Overfilling transmission case may result in oil leakage.

A. Draining and/or Adding Oil.

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING WORKED ON.

- (1) To drain: Remove oil drain plug (1, Fig. 6-2) and drain all old oil.
- (2) Replace the drain plug.
- (3) To add oil: Remove the top cover (2, Fig. 6-1) and the transmission fill plug (3, Fig. 6-1).
- (4) Refer to "Lubrication Chart", Section 6 for proper type transmission oil. Add oil through the transmission fill plug until the oil level is even with the line on the gauge (1, Fig. 6-1).
- (5) Turn on the power, start the mixer and look down the oil fill hole. Oil should be flowing from the oil delivery tube across the gear face.
- (6) If oil is not flowing, shut off the mixer and refer to Transmission Service.

2. Planetary.

The planetary has its own oil supply but due to the relatively small volume of oil (5 to 7 ounces) it is advisable to change it more frequently than the transmission oil, depending on usage.

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING WORKED ON.

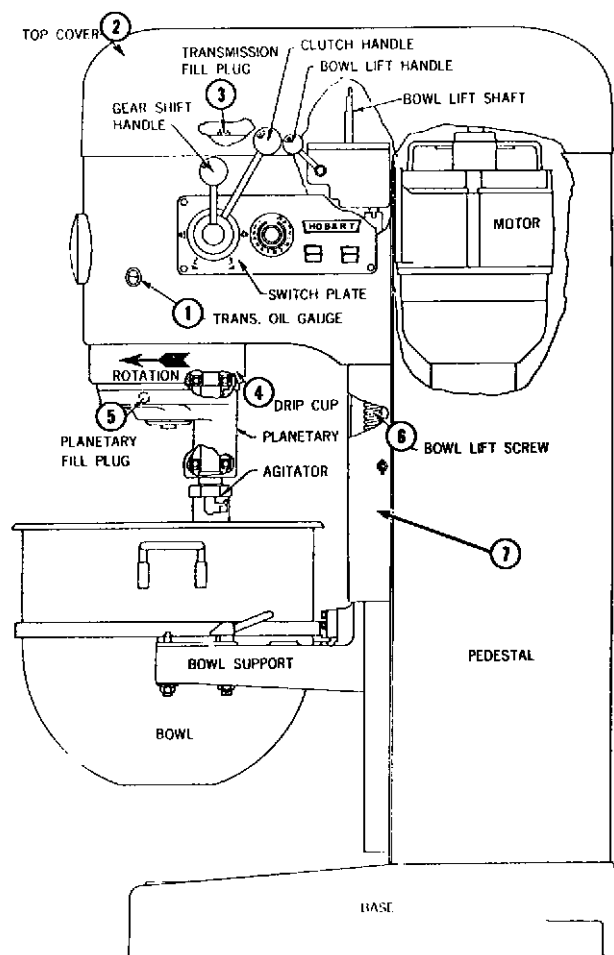


Fig. 6-1

- A. Remove the drip cup (4, Fig. 6-1). It has 2 screws.

NOTE: On the V-1401 mixer, the drip cup does not have to be removed.

- B. Remove the planetary oil drain plug (2, Fig. 6-2) and drain the old oil.
- C. Replace the drain plug.
- D. Remove the oil fill plug (5, Fig. 6-1) and pour the oil into the planetary. (Refer to "Lubrication Chart", Section 6 for the proper type and amount of lubrication.) The oil level should be even with the bottom of the oil fill hole.
- E. Replace the oil fill plug and the drip cup.

3. Bowl Lift Gear Case.

The bowl lift unit is grease packed and should not require additional lubrication. If unit is serviced, repack with new grease. (Refer to "Lubrication Chart", Section 6 for the proper type and amount of lubrication.)

4. Bowl Lift Screw Assembly.

The bowl lift screw assembly (1, Fig. 6-3) should be greased semi-annually (or more often depending on usage). See lubrication chart for proper lubricant.

- A. Place the bowl support in its lowest position.

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING WORKED ON.

- B. Remove the apron to gain access.
- C. Apply grease to the lift screw (1, Fig. 6-3). Refer to the "Lubrication Chart", Section 6 for the correct type of lubrication.
- D. Reinstall the apron.

5. Slideways.

The slideways (2, Fig. 6-3) should be lubricated semi-annually (or more often depending on usage).

- A. Place the bowl support in its lowest position.
- B. Remove the apron (7, Fig. 6-1) to gain access.
- C. Oilers are provided for lubricating the bowl slideways. Refer to the "Lubrication Chart", Section 6 for the correct type of lubrication.
- D. Reinstall the apron.

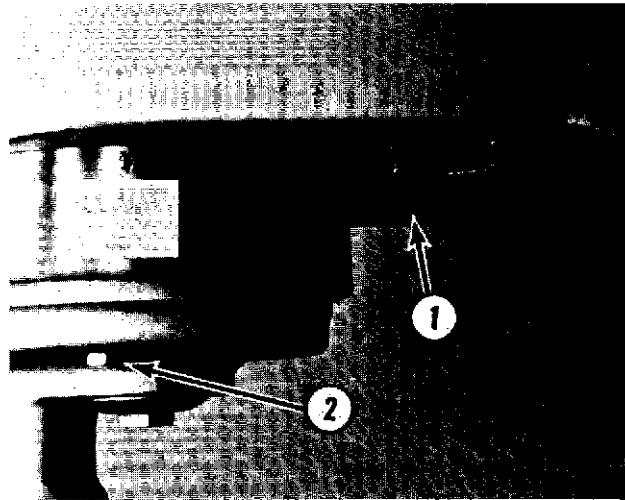


Fig. 6-2

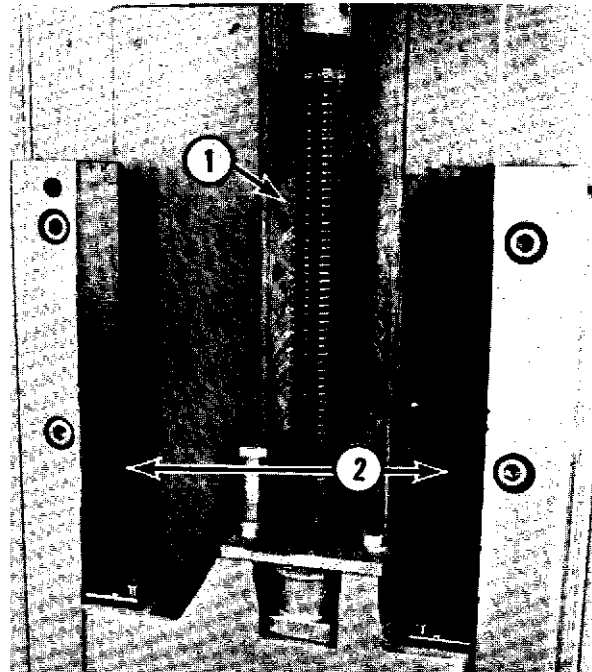


Fig. 6-3

6. Motor.

The motor has sealed bearings and does not require additional lubrication.

SECTION 7 ADJUSTMENTS

1. Bowl to Beater Clearance.

A. To Check.

- (1) With the flat "B" beater on the agitator shaft and the bowl securely locked on the bowl support, raise the bowl support to the extreme top position.

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING WORKED ON.

- (2) Check the clearance between the bottom of the beater and the bowl (1, Fig. 7-1). This clearance should be no more than $\frac{3}{32}$ ".

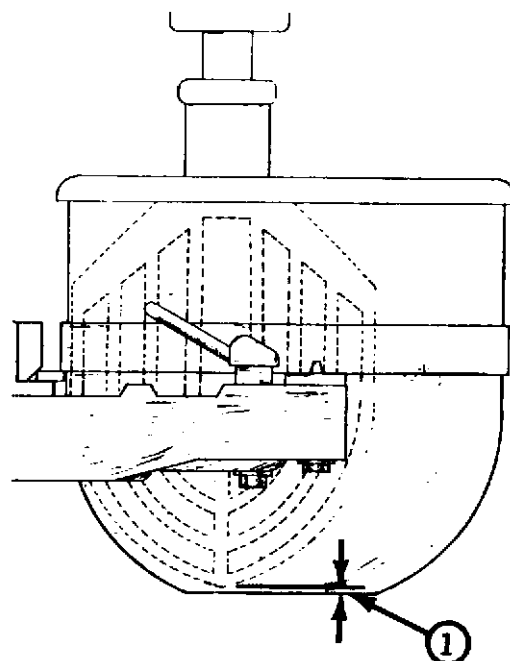


Fig. 7-1

B. To Adjust:

- (1) Remove the bowl apron (1, Fig. 7-2) and inner apron. (Older mixers do not have an inner apron.)
- (2) Loosen the locknut (2, Fig. 7-2) and turn the stop screw (3, Fig. 7-2) clockwise to decrease the clearance or counterclockwise to increase the clearance.

- (3) Tighten the locknut while holding the stop screw.

NOTE: It may be necessary to restart the mixer and lower the bowl in order to turn the stop screw counterclockwise.

- (4) Operate the bowl lift several times contacting both bottom and top stops. With the bowl lift against the top stop, recheck the clearance to assure correct adjustment.

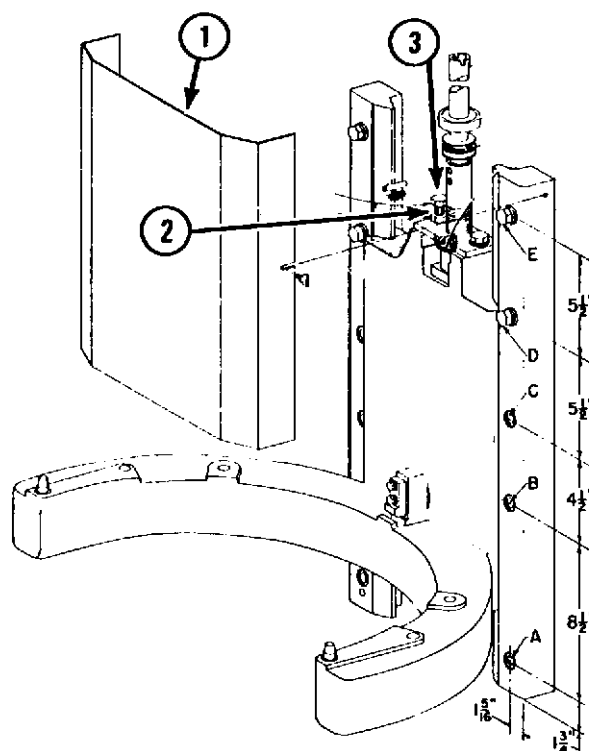


Fig. 7-2

2. Bowl Clamp Adjustment.

- A. The tension of the bowl clamps (1, Fig. 7-3) is controlled by a spring washer (2, Fig. 7-3) and locknuts (3-4, Fig. 7-3). The tension of the bowl clamp should be tight enough to maintain its position while engaged.
- B. To increase or decrease tension on the bowl clamps, reposition the locknuts.

3. Slideways.

Clearance between the slideways and bowl support should be held to a minimum without binding. Use the following procedure to adjust the slideways.

- A. Remove the bowl and agitator.
- B. Remove the apron (1, Fig. 7-2) and inner apron. (Older mixers do not have an inner apron.)
- C. Raise the bowl support to its top position and remove the body putty and paint from in front of the 3 bottom bolts (A.B.C., Fig. 7-2) on the right hand slideway.

NOTE: The left hand slideway is doweled and should not be loosened.

- D. Slightly loosen all 5 bolts that hold the right hand slideway to the pedestal.
- E. Holding a rag against the right hand slideway to protect the finish, tap the slideway with a rubber mallet until it is snug against the bowl support.
- F. Tighten the top slideway bolt (E, Fig. 7-2).
- G. Lower the bowl lift to 1-1/2" from the bottom. Tap on the slideway and tighten the bottom bolt.
- H. Tighten the remaining bolts and run the bowl lift up and down, with a load, to check for binding.

4. Bowl Lift "V" Belt.

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING WORKED ON.

A. To Check Adjustment.

- (1) The "V" belt should have 1/2" deflection (1, Fig. 7-4) between the drive pulley and the power bowl lift pulley.

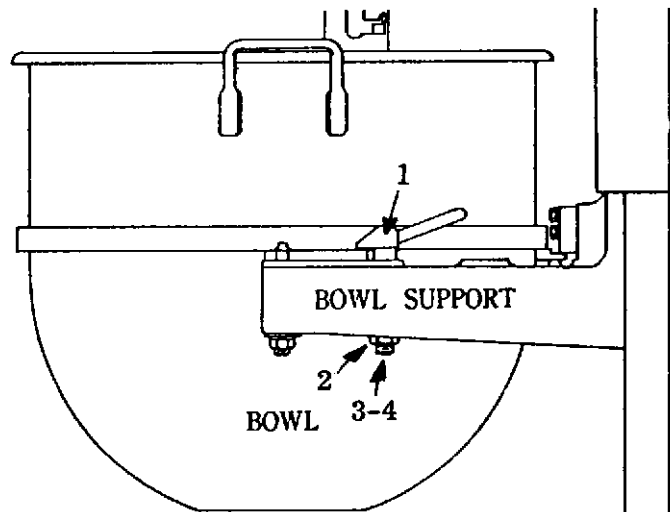


Fig. 7-3

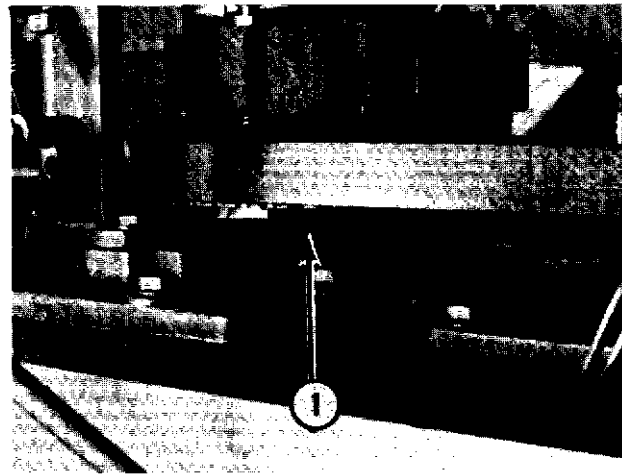


Fig. 7-4

B. Adjustment Procedure.

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING WORKED ON.

- (1) Loosen the holding screw (1, Fig. 7-5) and the pivot screw (2, Fig. 7-5).
- (2) Move the belt tightener mounting plate (3, Fig. 7-5) to achieve 1/2" belt deflection between the drive pulley and the power bowl lift pulley.
- (3) Tighten both the holding screw and the pivot screw to hold the adjustment.

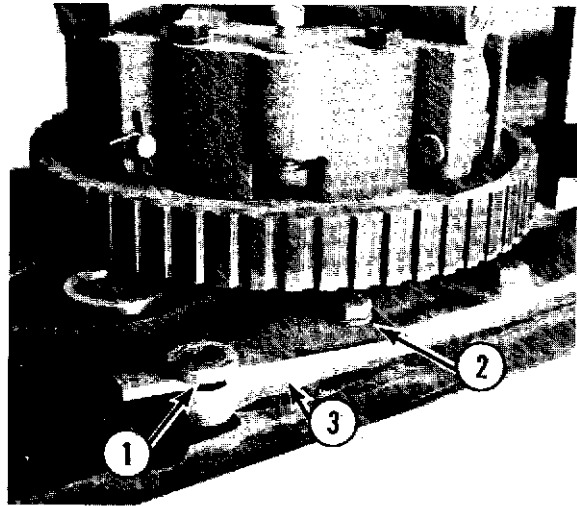


Fig. 7-5

5. Clutch Adjustment.

A. Checking for Correct Adjustment.

- (1) The clutch should not slip under load. The motor should stall before the clutch slips.
- (2) With the motor running and the clutch disengaged, the planetary should try to creep forward slightly. (The brake will prevent it from creeping.) Check by grasping the planetary casting and pulling against the clutch drag.
- (3) With the clutch engaged and the motor **not** running, visually check the clutch release springs (1, Fig. 7-6). They should not be fully compressed. (If they are fully compressed the pressure plate ears will break.)
- (4) If the above listed checks are correct, no further action is required.
- (5) If one or more of the above listed checks is not correct, the clutch must be adjusted.

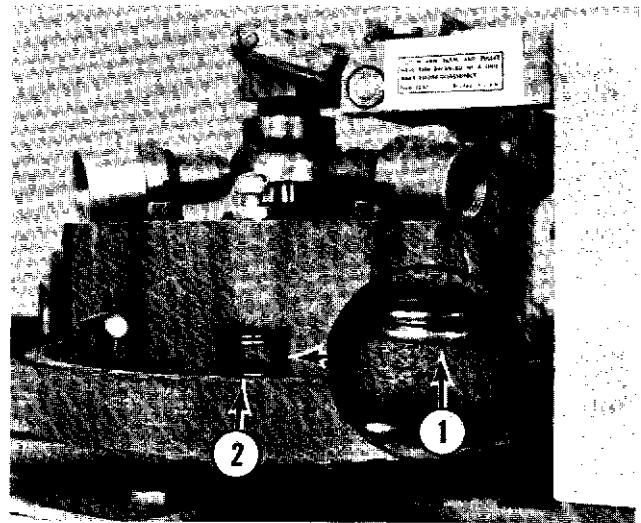


Fig. 7-6

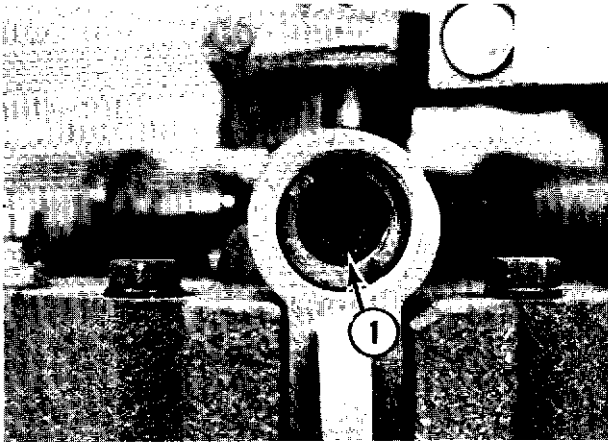


Fig. 7-7

B. Clutch Adjustment.

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING WORKED ON.

- (1) Remove the top cover.
- (2) Disengage the clutch.

NOTE: Do not adjust the ball operating spring tension (1, Fig. 7-7) in the clutch spring screw assemblies. The spring force on the ball is controlled by the hollow screw. The tension on this spring is preset at the factory. If you suspect this setting is incorrect, install a new clutch spring screw assembly (1, Fig. 7-8).

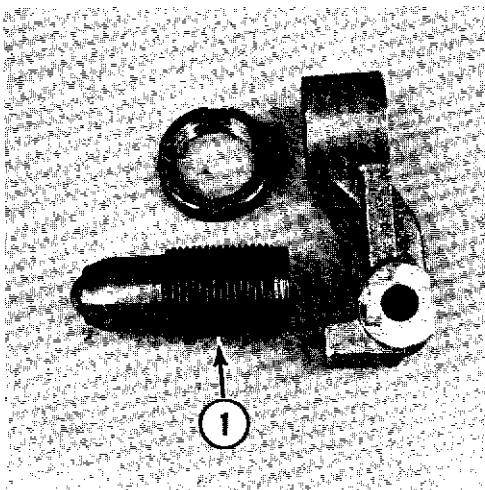


Fig. 7-8

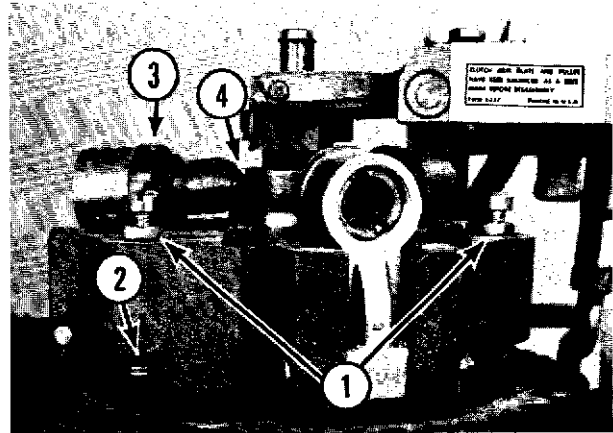


Fig. 7-9

- (3) Back off the three release spring screws (1, Fig. 7-9) until they no longer contact the release springs (2, Fig. 7-9).
 - (4) Loosen the three clutch spring screw locknuts (3, Fig. 7-9).
 - (5) Adjust the clutch spring screw to achieve a clearance of $9/64"$ between the ball and cam (4, Fig. 7-9). Use a $9/64"$ (.142) drill bit as the gauge.
 - (6) Lock the clutch spring screw with the locknut (3, Fig. 7-9).
 - (7) Repeat steps (5) and (6) on the other two clutch spring screws. Recheck the $9/64"$ clearance between the ball and cam on the three clutch arms.
- NOTE:** The clutch spring screws when adjusted correctly prevent clutch slipping.
- (8) Turn the three release spring screws in until they just touch the spring discs.

NOTE: Visually check to make sure that the disc and springs are not wedged in the clutch housing.

- (9) Advance each of the three release spring screws **EXACTLY** the same number of turns.
 - a. On the V-1401 mixer turn each of the release spring screws $3\frac{1}{2}$ turns and lock them with the locknuts.
 - b. On the M-802 mixer turn each of the release spring screws 4 turns and lock them with the locknuts.

NOTE: When the motor is running, centrifugal force acting on the clutch arm assemblies tends to engage the clutch. This force is overcome by the clutch release springs. When adjusted properly, the springs do not cause the clutch to release completely, but allows the centrifugal force to produce enough drag to cause the backlash to be removed from the transmission gear train. With the backlash removed, the transmission will shift smoothly.

- (10) Slowly engage the clutch (motor not running) while observing the clutch release springs (1, Fig. 7-6). The springs must not be fully compressed when the clutch is engaged or the ears (2, Fig. 7-6) on the pressure plate will break.
- (11) If the springs are nearly fully compressed, recheck the release spring screw adjustment, steps (8) and (9).
- (12) If the release spring screws are adjusted correctly and the springs are nearly fully compressed, the clutch disc are worn and must be replaced. (Refer to: Section 9, Clutch and Brake.)
- (13) Check the clutch for proper operation. Refer to: Clutch "Checking for Correct Adjustment".
- (14) Check the brake adjustment. Refer to: "Brake Adjustment".

6. Brake Adjustment.

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING WORKED ON.

A. Checking the Engaging Plate Position.

The engaging plate (1, Fig. 7-10) should contact the lower portion of the brake arm stop (2, Fig. 7-10) with the clutch disengaged.

B. Adjusting the Engaging Plate Position.

- (1) Remove the palnut (3, Fig. 7-10).
- (2) Adjust the position of the engaging plate by tightening or loosening the upper jam nut (4, Fig. 7-10).
- (3) When adjustment is complete, reinstall the palnut.

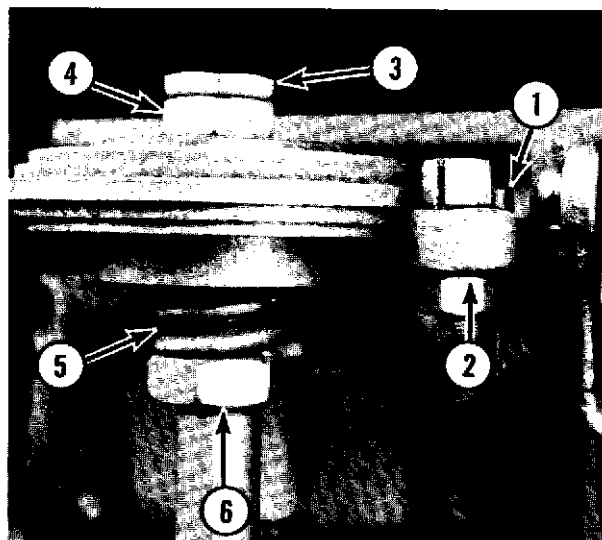


Fig. 7-10

C. Checking the Braking Action.

A properly adjusted brake is indicated by the following:

NOTE: If the clutch is not adjusted properly, the brake can appear to be out of adjustment. Before making any adjustments to the brake be sure the clutch is adjusted correctly.

- (1) With the motor running, clutch disengaged and the transmission in first speed, the brake unit should display sufficient braking action to overcome clutch drag.
- (2) With the mixer running in first speed disengage the clutch, the planetary should stop immediately at the time the clutch is disengaged.
- (3) With the mixer running, clutch disengaged and the transmission in first speed, you should be able to turn the planetary by hand in a clockwise direction. (Looking from the top of the mixer.)

CAUTION: When performing this test, grasp the cast part of the planetary. **DO NOT** grasp the agitator shaft.

D. Braking Action Adjustment.

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING WORKED ON.

The braking action is controlled by the compression of the spring (5, Fig. 7-10) located under the brake pressure plate and the lower hex nut.

- (1) Tighten or loosen the lower hex nut (6, Fig. 7-10) to attain the proper braking action.

7. Flexa-Gear.

A. To Check Tightness.

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING WORKED ON.

It should be as tight as possible without binding.

- (1) A good gauge of tightness is that it should slide over the motor drive gear without turning either the driven gear or the motor drive gear.

B. Adjustment.

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING WORKED ON.

Loosen the four motor mounting bolts and add or remove shims to provide the correct tension.

- (1) The upper two bolts are reached from inside the mixer housing (1, Fig. 7-11). They enter tapped holes in the transmission housing.
- (2) One of the lower bolts (1, Fig. 7-12) is reached by removing the clutch handle and name plate. Also the contactor on non-solid state machines.

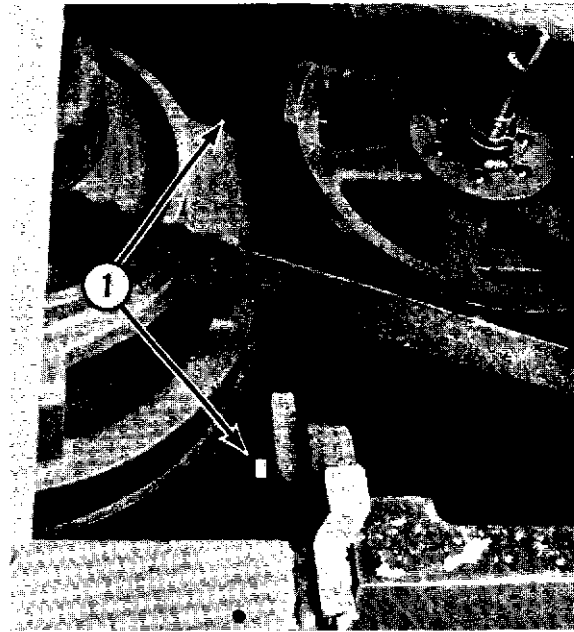


Fig. 7-11

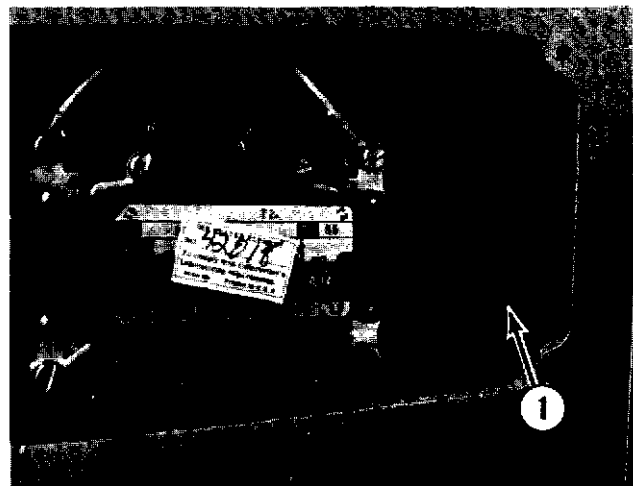


Fig. 7-12

- (3) The other lower bolt is reached through the area beneath the power bowl lift gear box. It enters a tapped hole in the motor base.
- (4) Shims are **FULL LENGTH** with open notches. They can be removed or installed without completely removing the motor bolts.
- (5) It is not necessary to use **EXACTLY** the same number of shims on each side as only one shim may provide the proper adjustment.

SECTION 8

MOTOR

1. Flexa-Gear Drive.

The Flexa-Gear is a flexible internal gear. It consists of multiple twisted steel cables imbedded in neoprene. The surface is nylon. It has precision teeth which mesh exactly with the teeth on the motor drive gear and the driven gear. It is a toothed drive - there can be no slip.

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING WORKED ON.

- A. To replace the Flexa-Gear, remove the cotter pin (1, Fig. 8-1) and the clevis pin (2, Fig. 8-1).
- B. Remove the four hex head bolts (3, Fig. 8-1) and swing the clutch operating mechanism away from the clutch operating cam bearing.
- C. Slide the Flexa-Gear up and off the motor drive gear and driven gear.
- D. When installing the Flexa-Gear, slide it down on the motor pinion and driven gear.
- E. Align the clutch yoke with the clutch operating cam bearing and slide it into place. Secure with the four bolts.
- F. Install the clevis pin and cotter pin.
- G. Check the adjustment. Refer to Adjustments "Flexa-Gear".

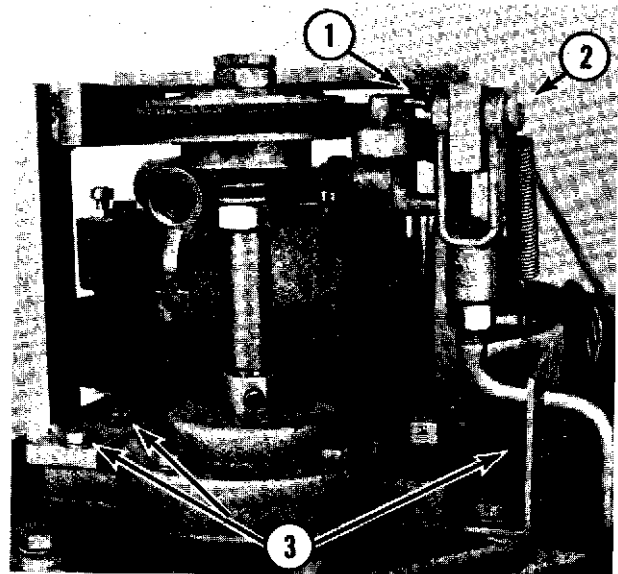


Fig. 8-1

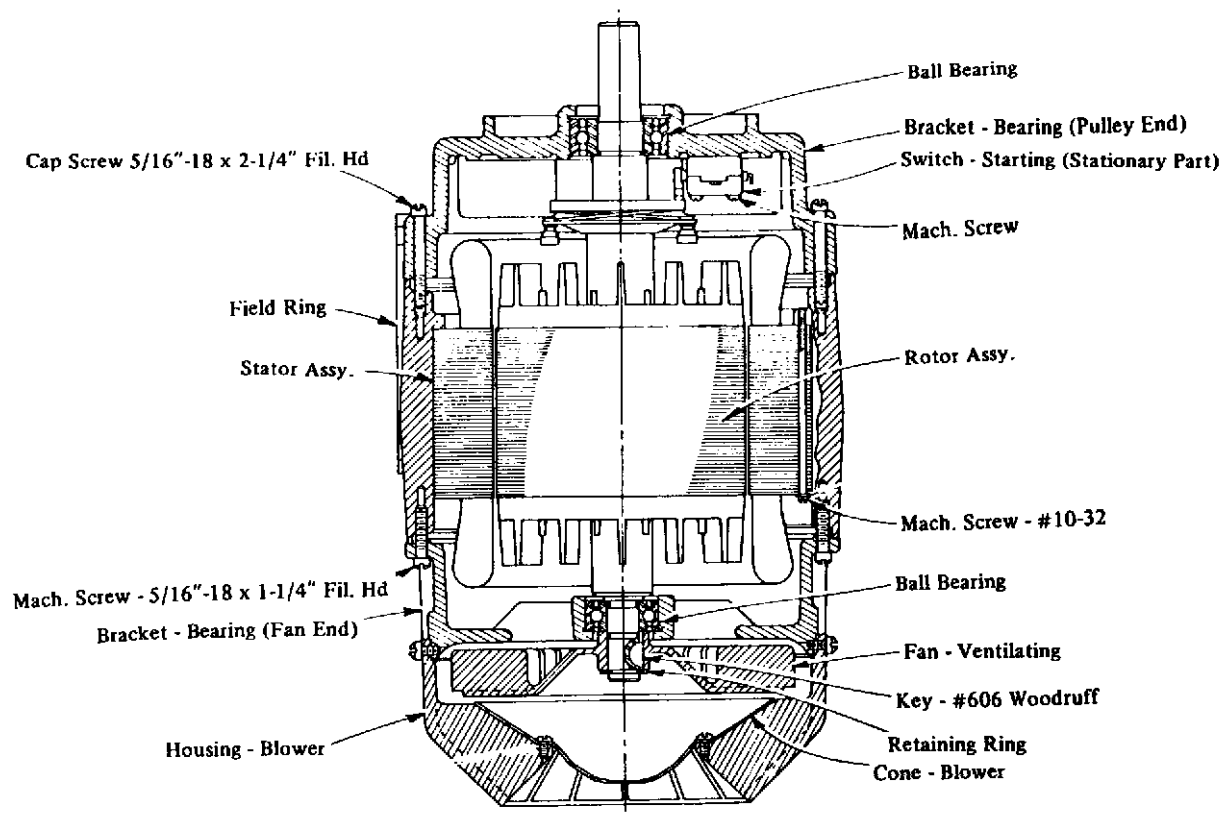


Fig. 8-2

2. Servicing Single Phase Starting Components. (Split Phase, Capacitor Start).

Single phase motors (Fig. 8-2) have a starting circuit consisting of two start capacitors, centrifugal switch and start windings.

The start windings assure rotation in the proper direction, and provides the needed torque to bring the motor up to speed. As the motor RPM increases to near its running speed, the start windings and capacitors are no longer needed and the centrifugal switch opens, removing power to the start windings. The motor then runs on the main windings.

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING WORKED ON.

A. Capacitors.

The best method to test a capacitor is to substitute a known good capacitor in its place.

B. Start Switch (Fig. 8-2).

If it is determined that the start switch has a malfunction, it can be removed without removing the motor from the mixer. Use the following procedure.

- (1) Remove the solid state control panel. (Where appropriate.) [Refer to "Removing Motor (Solid State Controls)".]
- (2) Remove the Flexa-Gear from the drive pulley.
- (3) Remove the drive gear.
- (4) Remove the motor bearing bracket.
- (5) Disconnect the leads to the start switch and remove the start switch.
- (6) Reassemble in the reverse order of disassembly.

3. Removing the Motor (Solid State Controls).

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING WORKED ON.

- A. Disconnect the motor leads from the terminal board. If the mixer is not equipped with a terminal board, disconnect the motor leads from the contactor (1, Fig. 8-3).
- B. Disconnect the motor thermistor leads (2, Fig. 8-3) (MT1 and MT2) from the motor protector board.
- C. Disconnect the leads from the line side of the contactor (1, Fig. 8-3).

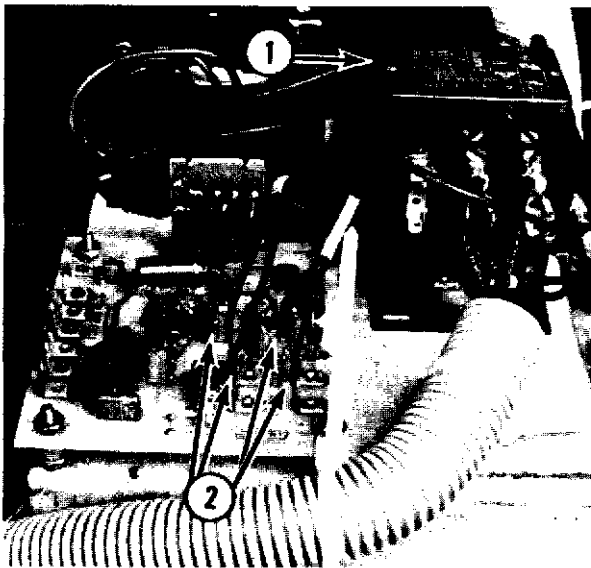


Fig. 8-3

- D. Disconnect leads MPB-CC1, MPB-X2 and ICON-C from the control panel.
- E. Loosen the four control panel mounting screws and remove the control panel.
- F. If the motor is single phase, remove the motor leads from the capacitors.
- G. Slip the Flexa-Gear off the motor drive gear.

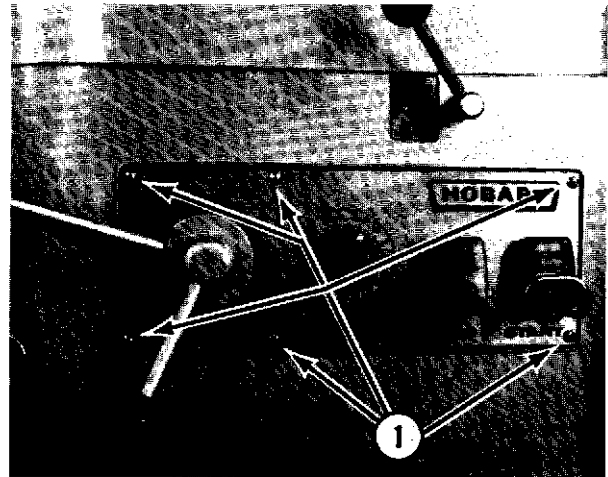


Fig. 8-4

- H. Remove the six switch plate mounting screws (1, Fig. 8-4).
- I. Remove the motor mounting bolt located behind the switch plate.
- J. Remove the motor mounting bolt located under the power bowl lift gear box.
- K. Loosen the two top motor mounting bolts (1, Fig. 8-5), and remove the shims. Note the location of each full shim as it should be reinstalled in the same position which it was removed.

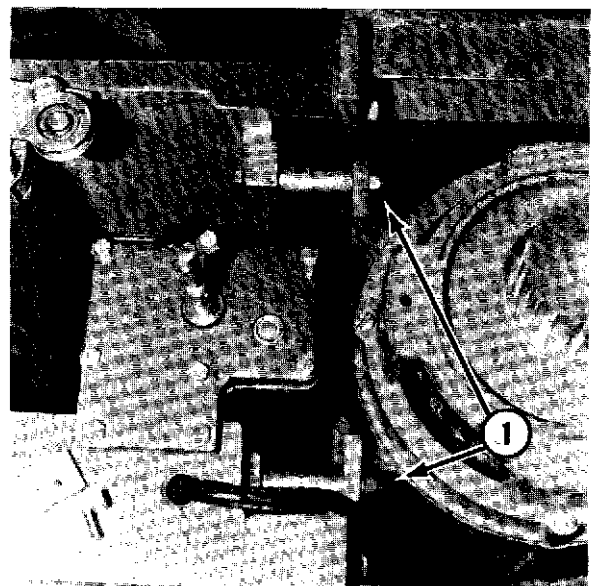


Fig. 8-5

- L. Support the motor while removing the two top motor mounting bolts.
- M. Remove the motor.

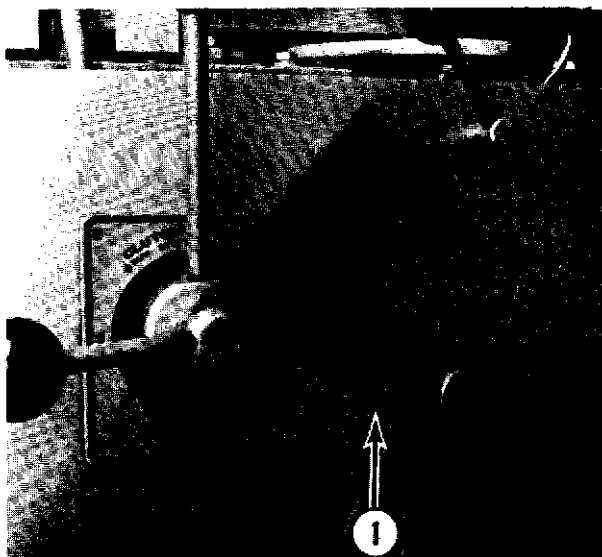


Fig. 8-6

4. Removing the Motor (Non Solid State Controls).

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING WORKED ON.

- A. Remove the switch plate (1, Fig. 8-6). Do not lose the push buttons (1, Fig. 8-7).

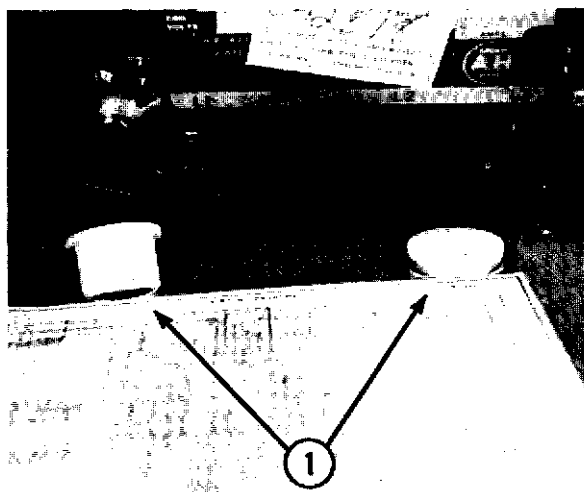


Fig. 8-7

- B. Disconnect the motor leads (T1-T2-T3) from the contactor and pull the leads out of the housing.
- C. Remove the contactor mounting screws and move the contactor to one side.

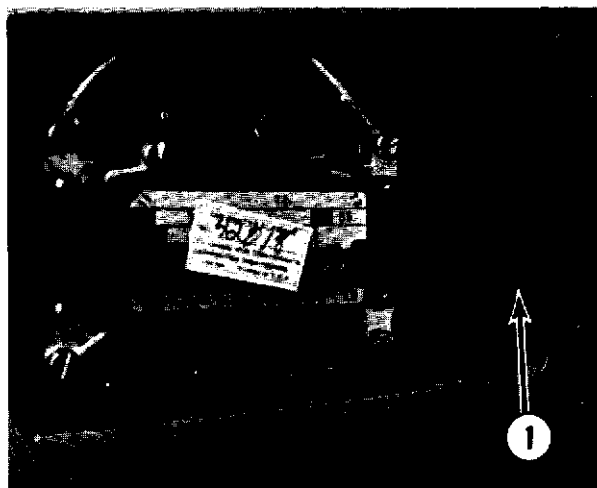


Fig. 8-8

- D. Remove the motor mounting bolt (1, Fig. 8-8) located behind the switch plate.
- E. Slip the Flexa-Gear off the motor drive gear.
- F. Remove the motor mounting bolt located under the power bowl lift gear box.
- G. If the motor is a single phase capacitor start type, remove the capacitor leads from the capacitors.

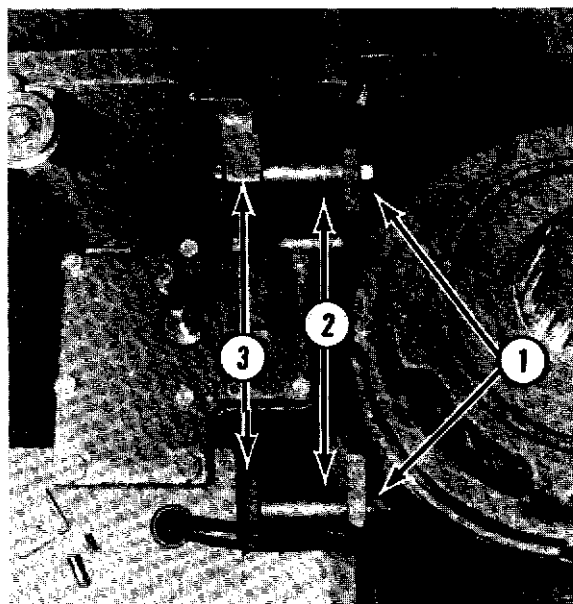


Fig. 8-9

- H. Loosen the two top motor mounting bolts (1, Fig. 8-9) and remove the shims. Note the location of each shim as they should be reinstalled in the same position which it was removed.

- I. Support the motor while removing the two top motor mounting bolts.
- J. Remove the motor.

5. Motor Disassembly (Fig. 8-2).

- A. Remove the motor drive gear.
- B. Remove the blower housing.
- C. Remove the fan retaining ring, fan and woodruff key.
- D. Mark the bearing bracket and remove the four screws and take off the fan end bearing bracket.
- E. Carefully withdraw the rotor out of the stator.
- F. If necessary, the stator can be removed from the field ring by removing the motor through bolts.
- G. If necessary, the bearings can be removed from the rotor.

6. Motor Reassembly (Fig. 8-2).

- A. If the stator was removed, install the stator into the field ring.
- B. If the pulley end bearing bracket was removed, install the pulley end bearing bracket onto the field rings.
- C. If the bearings were removed, install the bearings on the rotor.
- D. Carefully insert the rotor into the stator.
- E. Install the fan end bearing bracket.
- F. Install the woodruff key and the fan. Secure with the retaining ring.
- G. Install the blower housing.
- H. Install the spacer (if used) and the motor drive gear.

7. Installing the Motor (Solid State Controls).

- A. Place the motor into the pedestal.
- B. Support the motor while installing the two top motor mounting bolts (1, Fig. 8-9). Do not tighten the bolts.

NOTE: Install the motor spacers (2, Fig. 8-9) on the V-1401.

- C. Install, but do not tighten, the motor mounting bolt located under the power bowl lift gear box.
- D. Install, but do not tighten, the motor mounting bolt located behind the switch plate.
- E. Install the shims (3, Fig. 8-9) in the same position from which they were removed.
- F. Tighten the four motor mounting bolts.
- G. Install the Flexa-Gear. Check for correct adjustment. Refer to: Adjustments "Flexa-Gear".
- H. If the motor is single phase, connect the capacitor leads.
- I. Install the control panel and secure with the four panel mounting bolts.
- J. Connect line leads (L1-L2-L3) to the line side of the contactor.
- K. Connect the motor thermistor leads (MT1 and MT2) to the motor protector board.
- L. Connect leads MPB-CC1, MPB-X2 and 1CON-C1 on the control panel.

MOTOR CONNECTION TO TERMINAL BLOCKS.
(Terminal Block is Located Beside the Fuse Board)

VOLTAGE	1TB-1	1TB-2	1TB-3	1TB-4	1TB-5	1TB-6
230/60/3	T1, 1, 7	T2, 2, 8	T3, 3, 9		4, 5, 6	
460/60/3	T1, 1	T2, 2	T3, 3	4, 7	5, 8	6, 9

Fig. 8-10

- M. Connect the motor leads to the terminal board as shown (Fig. 8-10) to make the motor operate on the desired voltage. If the mixer is not equipped with a terminal board, connect the motor leads (T1-T2-T3) to the load side of the contactor.

8. Installing the Motor (Non Solid State Controls).

- A. Place the motor into the pedestal.
- B. Support the motor while installing the two top motor mounting bolts (1, Fig. 8-9). Do not tighten the bolts.

NOTE: Install the spacers (2, Fig. 8-9) on the V-1401.

- C. Install, but do not tighten, the motor mounting bolt located under the power bowl lift gear box.

NOTE: If the motor has been replaced with a current production type motor see TSB 445A for service kits which are required when installing the new motor.

- D. Install, but do not tighten, the motor mounting bolt located behind the switch plate.
- E. Install the shims (3, Fig. 8-9) in the same position from which they were removed.
- F. Tighten the four motor mounting bolts.
- G. Install the Flexa-Gear. Check for correct adjustment. Refer to: Adjustments "Flexa-Gear".
- H. If the motor is single phase, connect the capacitor leads.
- I. Install the contactor.
- J. Position the motor leads through the wire channel and connect the motor leads (T1-T2-T3) to the contactor.

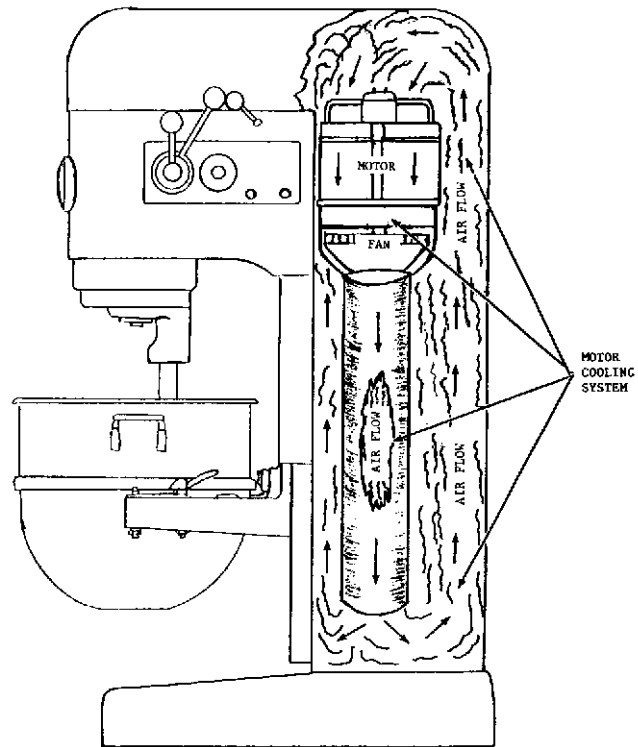


Fig. 8-11

- K. Install the switch plate.

NOTE: Be sure the push buttons are installed behind the switch plate.

- L. If the motor is a replacement motor and has thermistors, tape the thermistor leads together to prevent them from being shorted or damaged.

9. Motor Cooling System (Fig. 8-11).

The fan on the lower end of the motor re-circulates the air within the pedestal and housing cover with no openings to the outside. The motor is located over an air conductor which forces the air from the motor to the bottom of the pedestal. The air is cooled as it returns upward along the side of the pedestal.

SECTION 9

CLUTCH AND BRAKE

1. Brake.

The brake as well as the clutch is controlled by the clutch handle. The brake assembly is designed to hold the planetary motionless when the mixer motor is running and the clutch is disengaged. The brake arm assembly is so designed that it delays release of the brake until the clutch is completely engaged. The planetary will stop immediately if the operator releases the clutch handle. This insures that the operator has full control when the load is picked up gradually by slipping the clutch and brake at the same time.

A. Removal.

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING WORKED ON.

- (1) Drive out the pin (1, Fig. 9-1) and lift the brake assembly out of the planetary shaft.

B. Disassembly.

The brake can be disassembled while still mounted on the planetary shaft if desired.

- (1) Remove the palnut (2, Fig. 9-1) and the jam nut (3, Fig. 9-1).
- (2) Lift off the hub (4, Fig. 9-1) and key, friction discs (5, Fig. 9-1), friction washers (6, Fig. 9-1), engaging plate (7, Fig. 9-1) and the pressure plate (8, Fig. 9-1).
- (3) Inspect all parts. Replace any worn part and assemble in the reverse order of disassembly.
- (4) Adjust the brake. Refer to: Adjustments "Brake Adjustment".

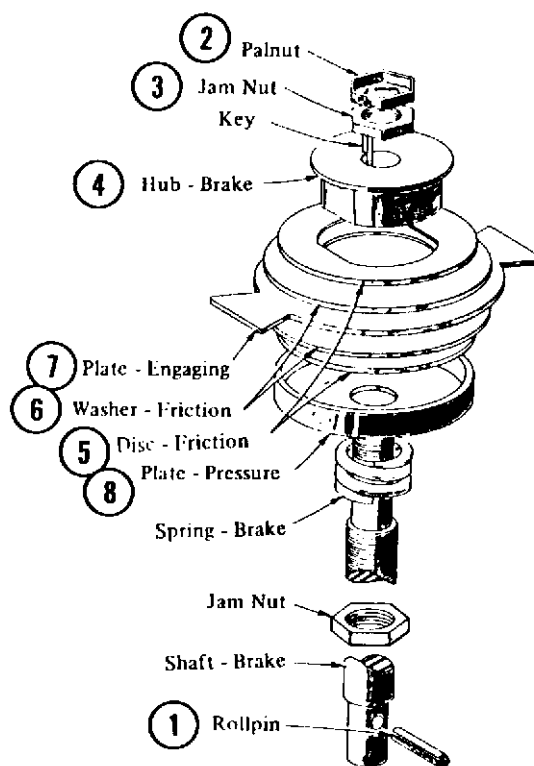


Fig. 9-1

2. Clutch.

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING WORKED ON.

A. Removal of Clutch As A Unit.

If it is necessary to work on the transmission or the bowl lift gear box, remove the clutch as a unit. The clutch adjustments will not be disturbed, thus eliminating the need to readjust the clutch.

- (1) With the motor not running, move the clutch lever to the "RUN" position. (Engage the clutch.)
- (2) Disconnect the clevis by removing the clevis pin (1, Fig. 9-2).
- (3) Remove the four bolts (2, Fig. 9-2) that hold the clutch support bracket.
- (4) Swing the clutch operating mechanism out of the way.

NOTE: The punch marks on the arm plate and the driven gear (Fig. 9-3) must be reassembled together. These parts are balanced as a unit. If the punch marks cannot be located, be sure to mark the arm plate and the driven gear before disassembly.

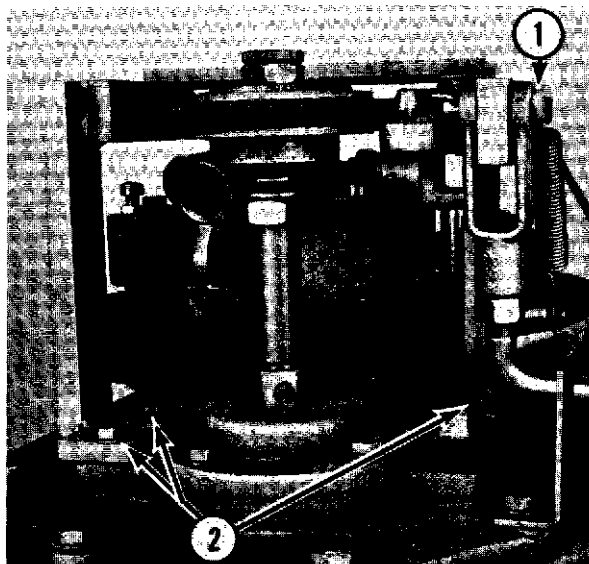


Fig. 9-2

- (5) Remove the six hex head bolts (Fig. 9-4) and lift the clutch arm plate (Fig. 9-5) off the driven gear.

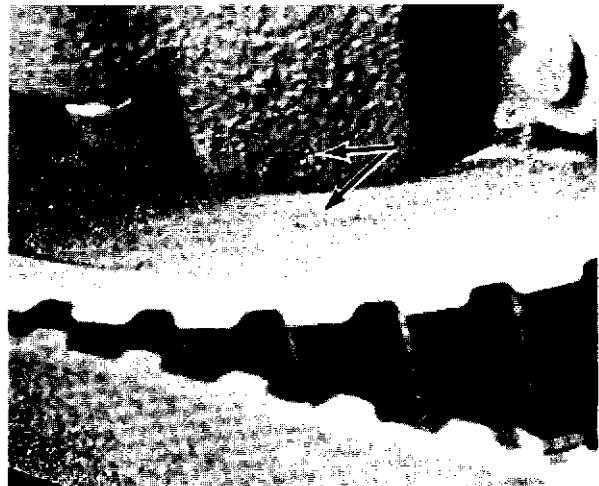


Fig. 9-3

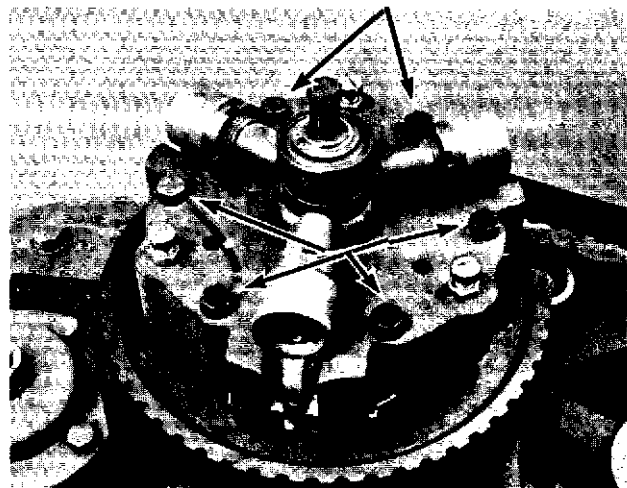


Fig. 9-4

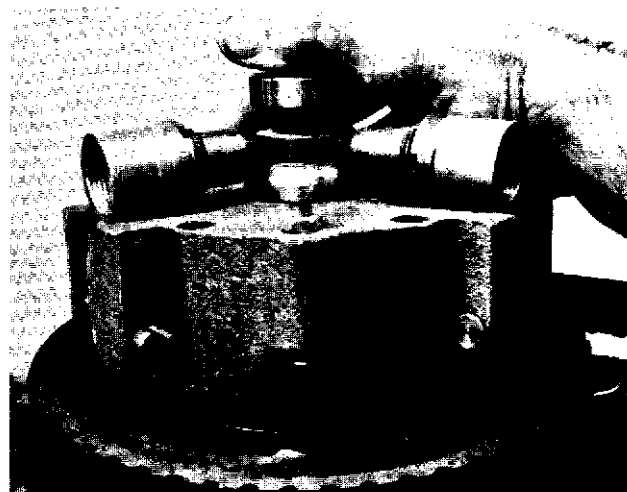


Fig. 9-5

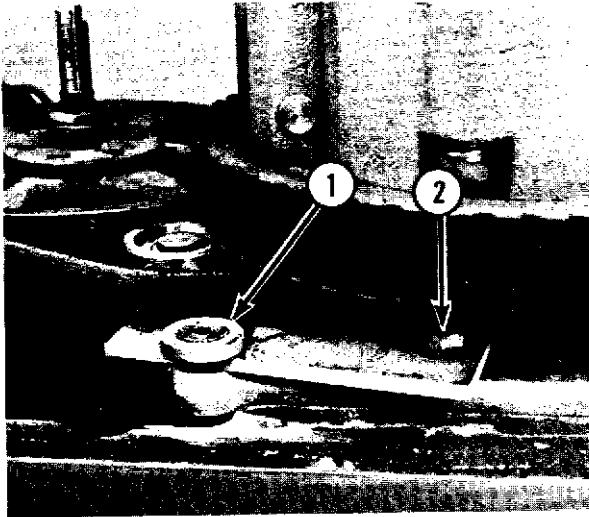


Fig. 9-5A

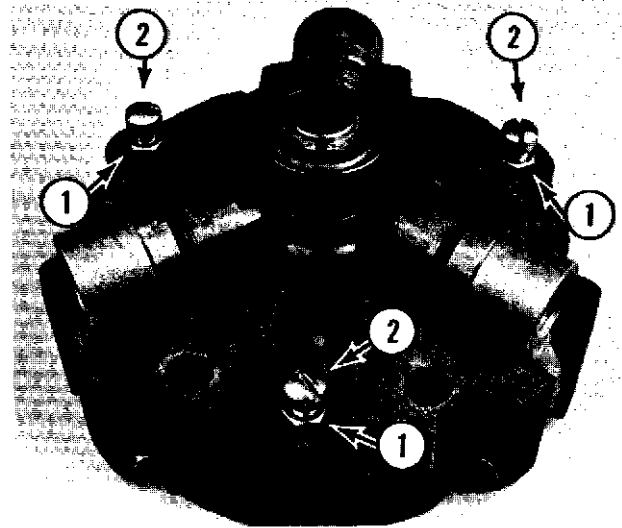


Fig. 9-7

- (6) Remove the retaining ring (1, Fig. 9-6) and shims (2, Fig. 9-6).
- (7) Remove the splined hub (3, Fig. 9-6) and key.
- (8) Remove the Flexa-Gear.
- (9) Loosen the holding screw (1, Fig. 9-5A) and pivot screw (2, Fig. 9-5A) and move the belt tightener mounting plate and remove the bowl lift "V" belt.
- (10) Remove the driven gear (4, Fig. 9-6).

B. Clutch Disassembly.

- (1) Remove the clutch as described in "Removal of Clutch As A Unit" except the clutch should not be engaged.
- (2) Loosen the locknuts (1, Fig. 9-7) and back out the three release spring screws (2, Fig. 9-7).
- (3) Remove the cotter pins (1, Fig. 9-8) and take off the pivot pins (2, Fig. 9-8).

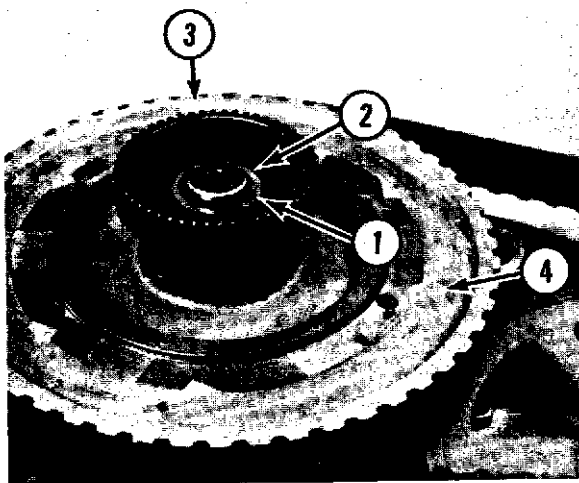


Fig. 9-6

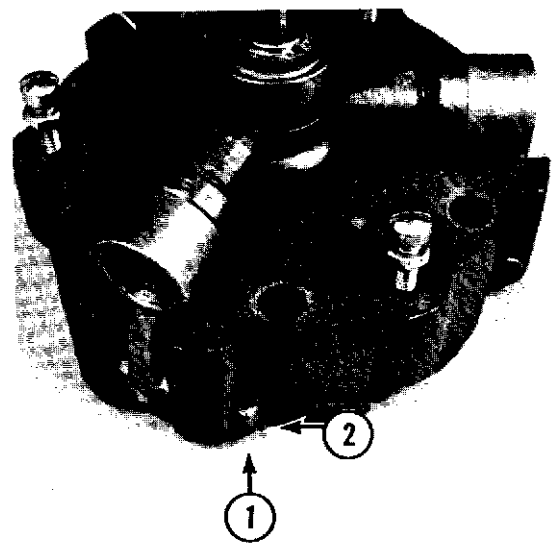


Fig. 9-8

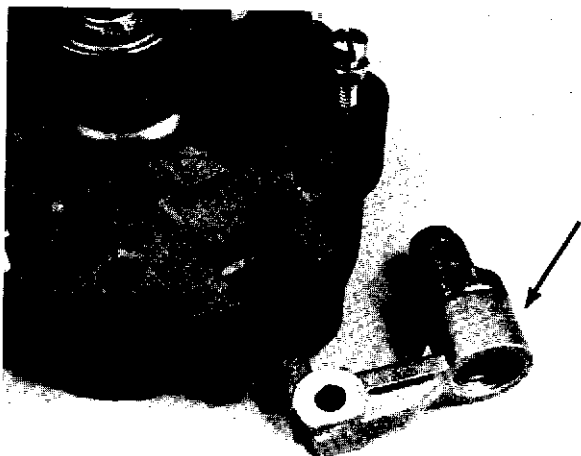


Fig. 9-9

- (4) Lift off the three clutch arms (Fig. 9-9).

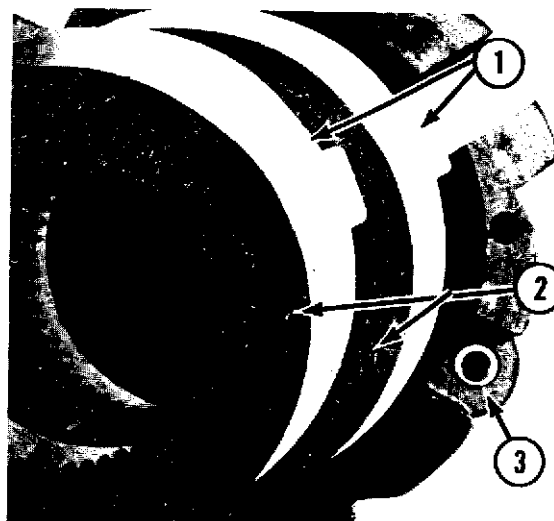


Fig. 9-11

- (5) Remove the pressure plate (1, Fig. 9-10), steel discs (1, Fig. 9-11) and inner discs (2, Fig. 9-11).

NOTE: The V-1401 clutch has three steel discs and three inner discs. The M-802 clutch has two steel discs and two inner discs.

- (6) The three release springs (3, Fig. 9-11) and spring discs can now be removed.

C. Clutch Assembly.

- (1) Clean each part with a clean cloth. Do not use any cleaning solvent on the clutch parts because the solvent may cause the clutch to slip. Inspect the molded disc, steel disc and pressure plate for wear and replace if necessary. (Normally the molded inner disc only needs to be replaced.)

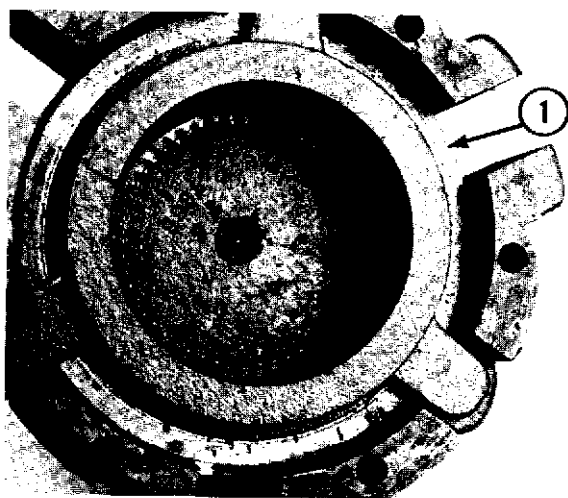


Fig. 9-10

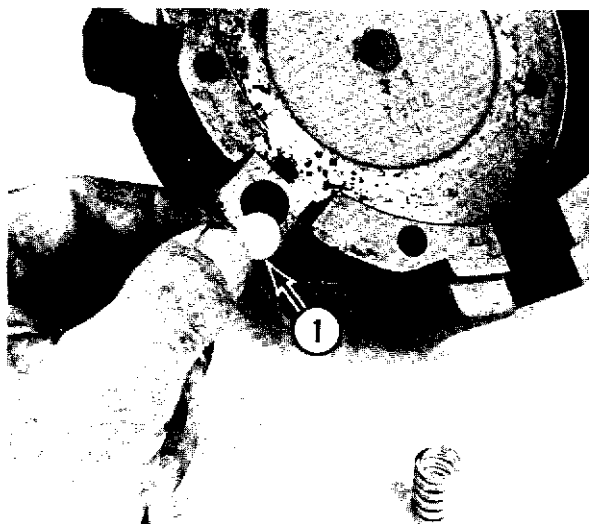


Fig. 9-12

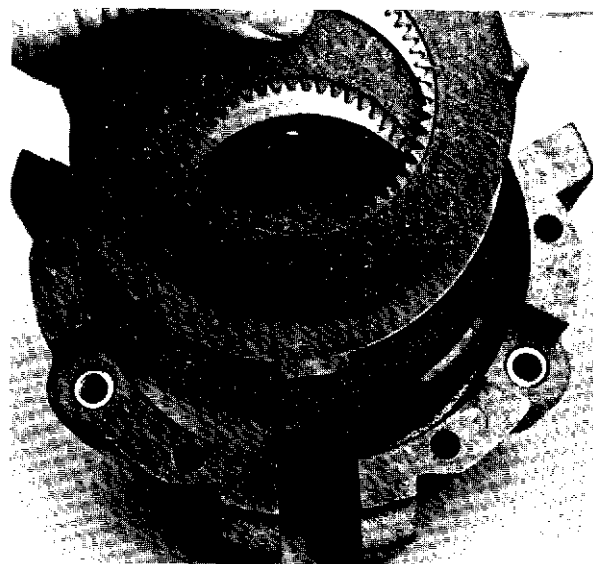


Fig. 9-14

- (2) With the clutch arm plate inverted on a work bench, insert the three spring discs (1, Fig. 9-12).
- (3) Insert the three clutch release springs (1, Fig. 9-13).

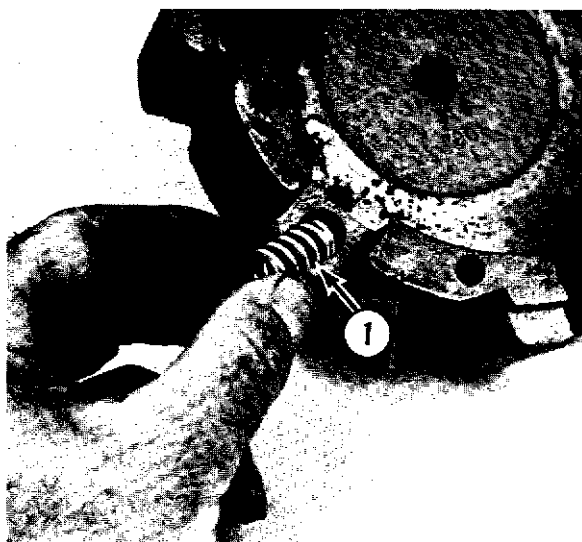


Fig. 9-13

- (4) Install the steel outer disc and the molded inner disc as shown in Fig. 9-14 and Fig. 9-15.
 - a. The M-802 clutch has two steel outer discs and two molded inner discs.
 - b. The V-1401 clutch has three steel outer discs and three molded inner discs.

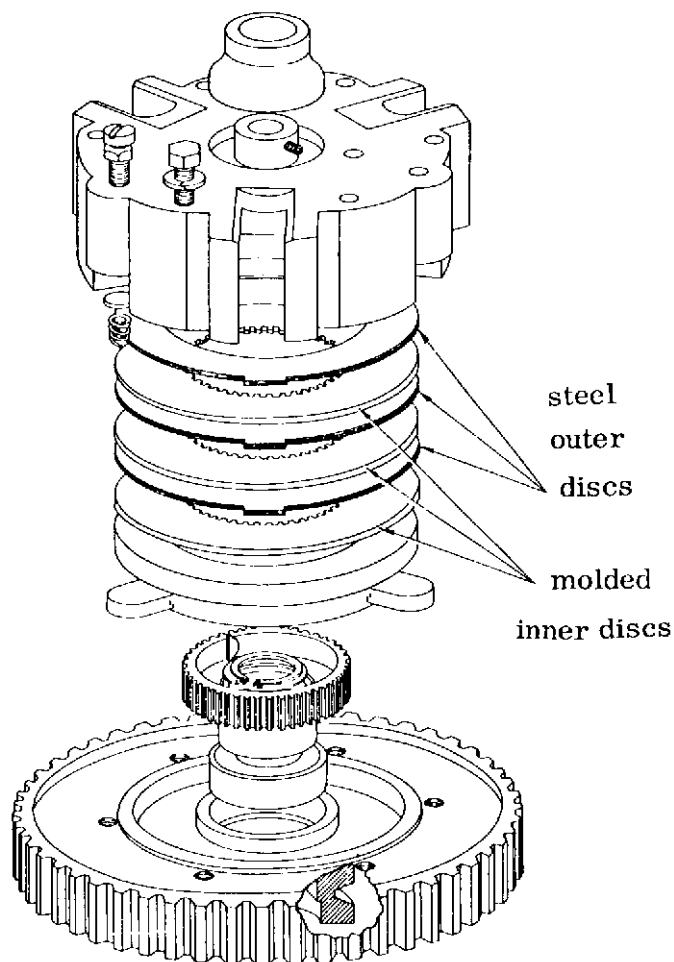


Fig. 9-15

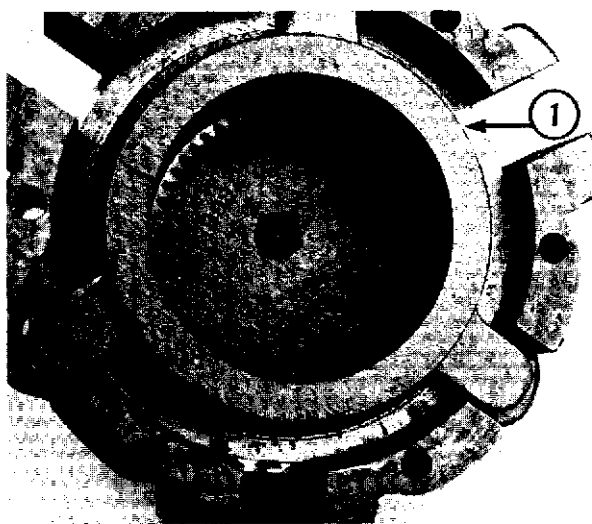


Fig. 9-16

- (5) Install the pressure plate (1, Fig. 9-16).
- (6) Install the three clutch arm assemblies (1, Fig. 9-17).
- (7) Install the pin (2, Fig. 9-17) and cotter pin (3, Fig. 9-17).

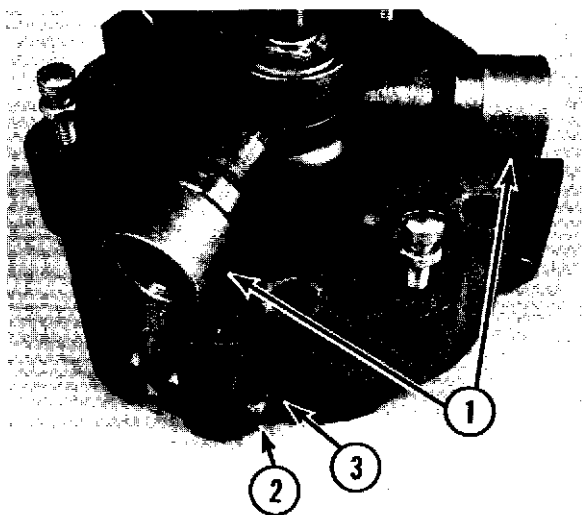


Fig. 9-17

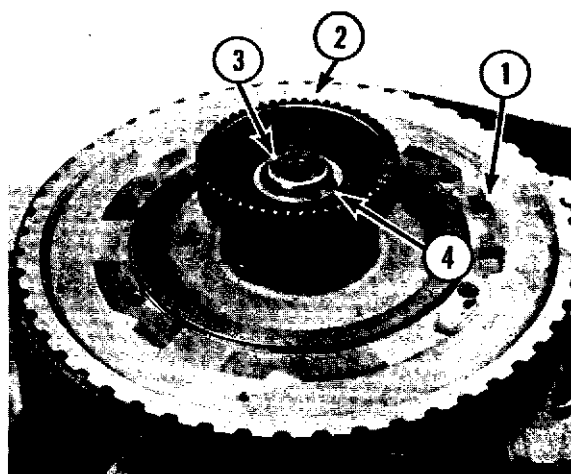


Fig. 9-18

D. Installing The Clutch.

- (1) Install the driven gear (1, Fig. 9-18).
- (2) Install the key and splined hub (2, Fig. 9-18).
- (3) Install the shims (3, Fig. 9-18) and retaining ring (4, Fig. 9-18).
- (4) Install and adjust the bowl lift "V" belt. Refer to: Adjustments "Bowl Lift "V" Belt".
- (5) Install the Flexa-Gear.
- (6) Place the clutch arm plate assembly (1, Fig. 9-19) on the driven gear (2, Fig. 9-19), being careful to align the molded disc teeth with the teeth on the splined hub.

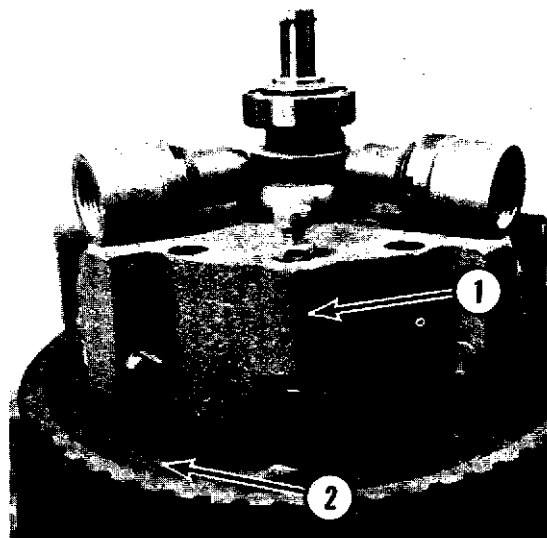


Fig. 9-19

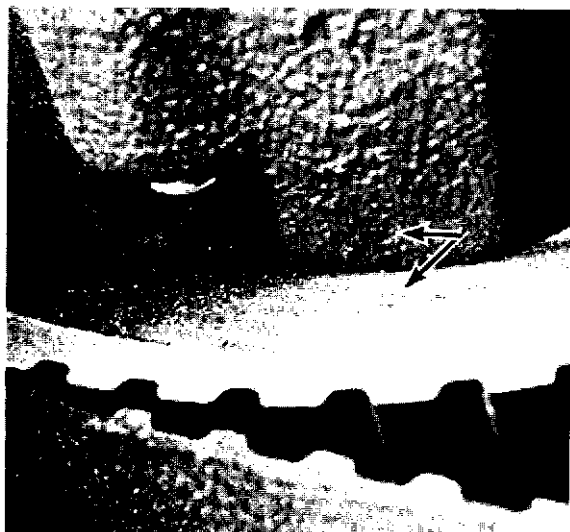


Fig. 9-20

- (7) Rotate the clutch arm plate assembly and align the balance mark with the balance mark on the driven gear (Fig. 9-20).
- (8) Install the six hex bolts (Fig. 9-21).

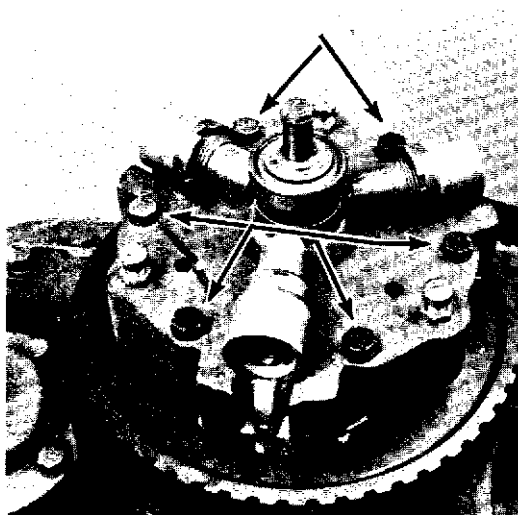


Fig. 9-21

- (9) Install the clutch operating mechanism and secure with the four bolts.
- (10) Connect the clevis pin and secure with a cotter pin.
- (11) Adjust the clutch. Refer to: Adjustments "Clutch".

E. Clutch Linkage Spring (Fig. 9-22).

The clutch linkage spring returns the clutch and brake arm to its top position when the clutch handle is released. In the top position the brake is engaged and the clutch is disengaged.

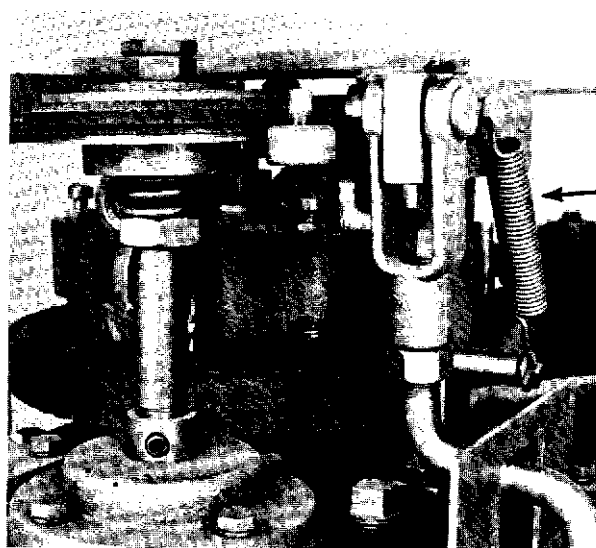


Fig. 9-22

SECTION 10 PLANETARY

1. Agitator Shaft Pin Replacement.

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING WORKED ON.

- A. Remove the agitator shaft plug (1, Fig. 10-1).
- B. Remove the locking set screw (2, Fig. 10-1) and the cone point set screw (3, Fig. 10-1).

NOTE: Set screws may be socket head type.

- C. Remove the agitator shaft pin (4, Fig. 10-1), use a punch to drive the pin from the back side of the shaft.

NOTE: Some agitator shafts do not have a driving hole drilled through the back side. If the agitator shaft pin cannot be removed it will be necessary to replace the agitator shaft.

- D. Install the agitator shaft pin so that the cone point set screw will fit into the counter sunk hole.
- E. Install the locking set screw, and the agitator shaft plug.

2. Removal of the Planetary.

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING WORKED ON.

- A. Remove the bowl and beater.
- B. Remove the drip cup (1, Fig. 10-2).
- C. Drain the oil from the planetary. Remove the drain plug (2, Fig. 10-2).
- D. If V-1401, remove the bearing plate cover (1, Fig. 10-3).
- E. If V-1401, remove the six hex head bolts and remove the bearing plate (2, Fig. 10-3).
- F. Install the bowl and place a 2" x 4" board across the bowl.

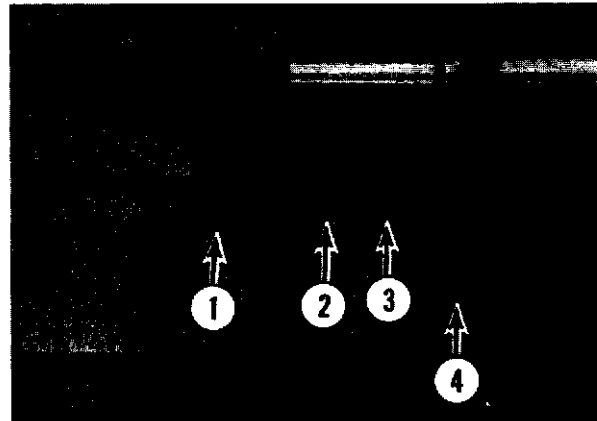


Fig. 10-1

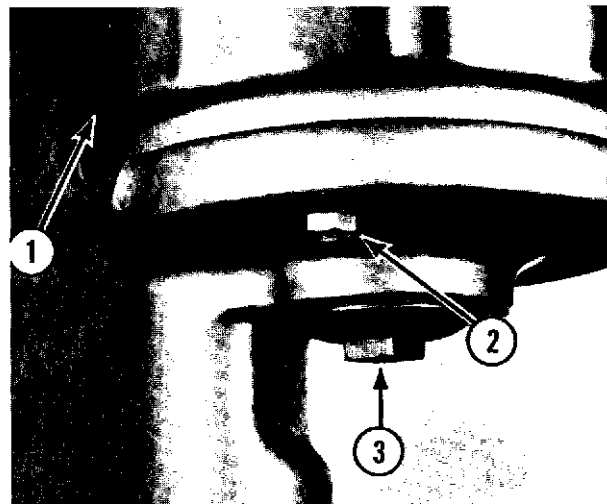


Fig. 10-2

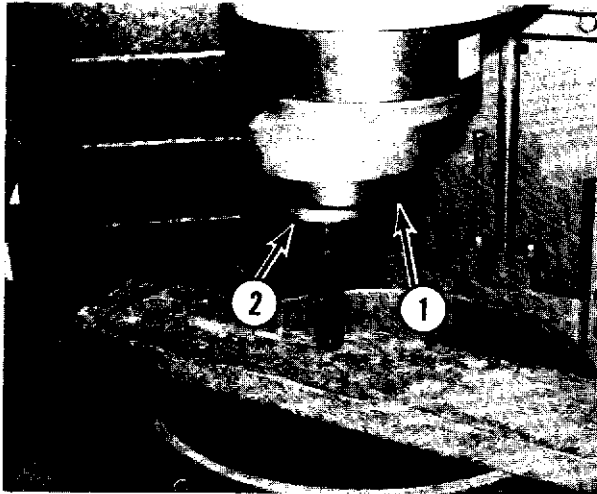


Fig. 10-3

- G. Raise the bowl to support the weight of the planetary (Fig. 10-3).
- H. Remove the seal cap (3, Fig. 10-2).
- I. Remove the special cap screw (1, Fig. 10-4).
- J. Remove the locknut (2, Fig. 10-4), tongue washer (1, Fig. 10-5) and the lower roller bearing (2, Fig. 10-5).
- K. Lower the bowl (support the planetary) and remove the planetary off the planetary shaft.

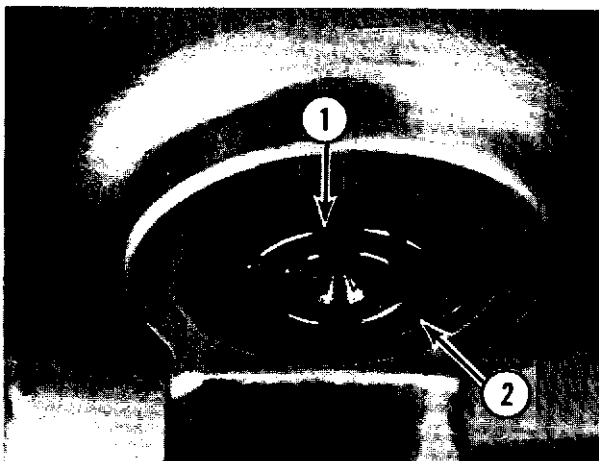


Fig. 10-4

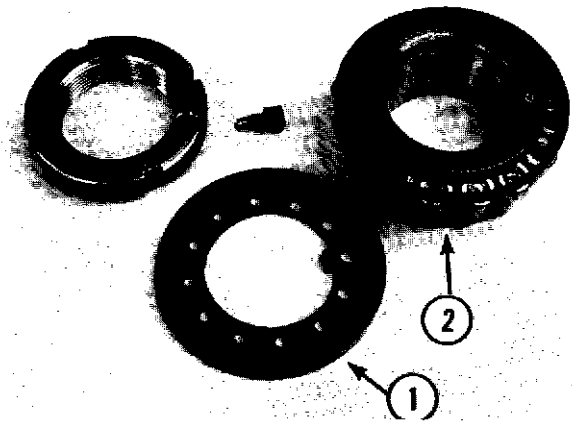


Fig. 10-5

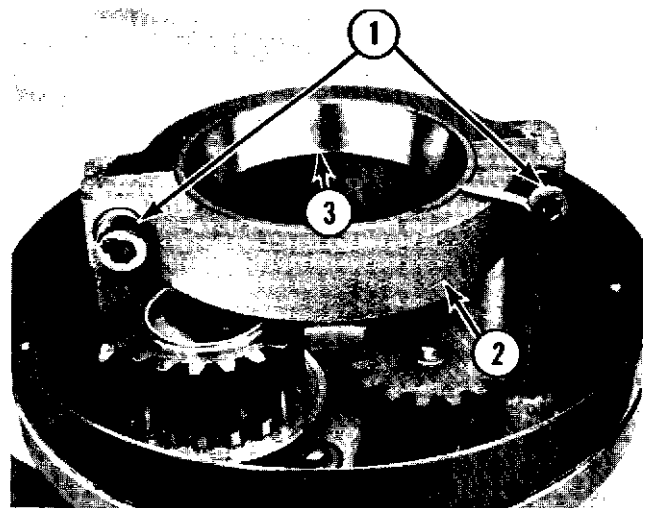


Fig. 10-6

3. Agitator Shaft Removal.

- A. With the planetary removed from the mixer, remove the two socket head screws (1, Fig. 10-6), and the bearing cap (2, Fig. 10-6) and bearing cup (3, Fig. 10-6).

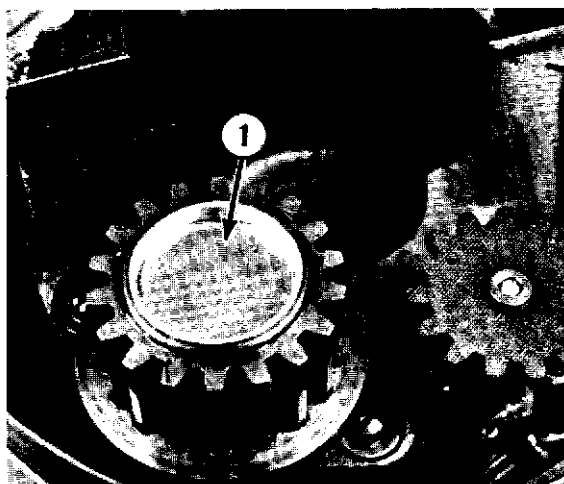


Fig. 10-7

B. Pry out the oil retaining cap (1, Fig. 10-7).

C. Remove the retaining ring (1, Fig. 10-8) and the pinion (2, Fig. 10-8) and key.

NOTE: If an internal pinion shim has been used it will be under the pinion. It must be reassembled exactly as found.

D. Remove the two machine screws (3, Fig. 10-8) and lift out the planetary oil baffle (1, Fig. 10-9).

E. Use a rubber mallet and force the agitator shaft down through the upper bearing.

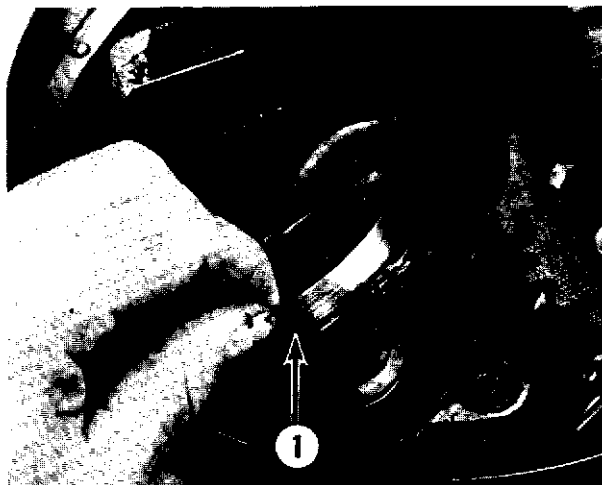


Fig. 10-9

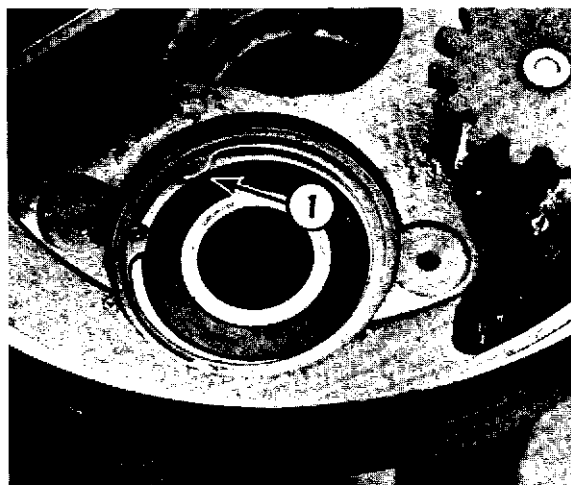


Fig. 10-10

F. Remove the retaining ring (1, Fig. 10-10) and lift out the upper agitator shaft bearing.

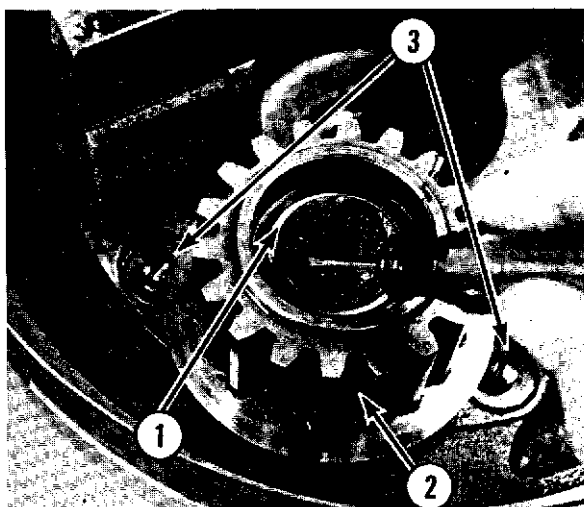


Fig. 10-8

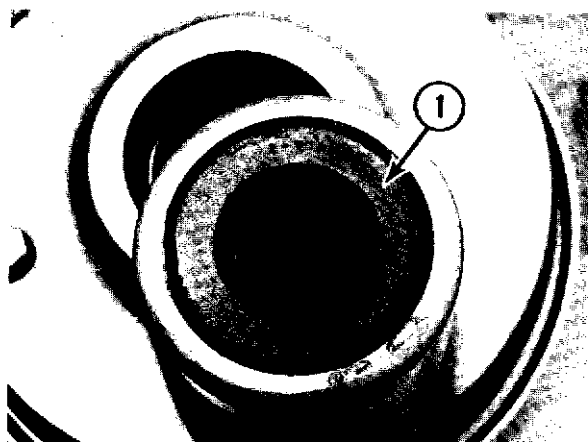


Fig. 10-11

- G. Remove the seal (1, Fig. 10-11), located at the bottom of the planetary.

NOTE: The seal and lower bearing on the V-1401 planetary is located in the bearing plate cover.

- H. Remove the retaining ring, if servicing a V-1401 and remove the bottom bearing.

4. Installing the Agitator Shaft.

- A. Clean, inspect and replace if necessary, the bearings, seals and shaft.
- B. Install the lower planetary bearing.
- C. Install the retaining ring, if V-1401.
- D. Carefully install the lower seal (1, Fig. 10-11).
- E. Insert the agitator shaft into the lower seal and bearing.

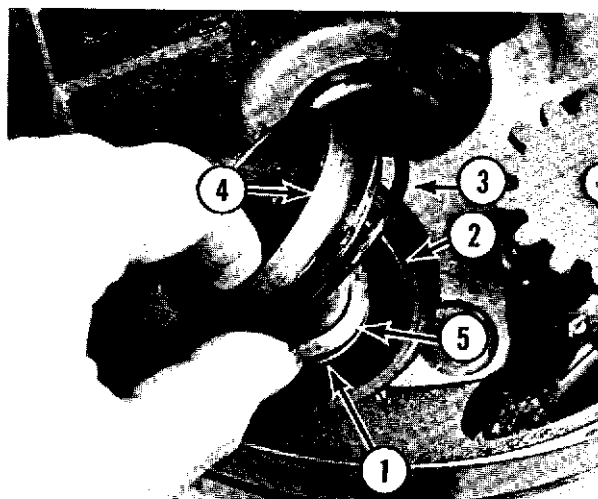


Fig. 10-12

- F. Install the agitator shaft spacer (V-1401) and the upper bearing (1, Fig. 10-12) and the retaining ring (2, Fig. 10-12).
- G. Lightly coat the "O" ring with Permatex #2, and install the "O" ring (3, Fig. 10-12) and oil baffle (4, Fig. 10-12). Secure with the two screws.
- H. M-802 only. Install the agitator shaft spacer and internal pinion shim (5, Fig. 10-12).
- I. Install the key (1, Fig. 10-13), pinion (2, Fig. 10-13) and the retaining ring.

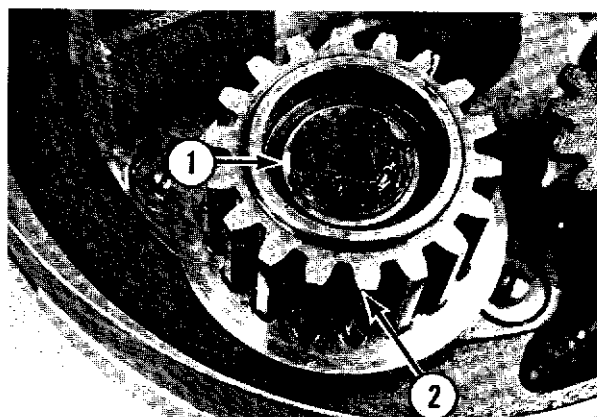


Fig. 10-13

J. Seal the retaining cap with Permatex #2 and install it into the pinion (1, Fig. 10-14).

K. Install the bearing cup (2, Fig. 10-14) and bearing cap (3, Fig. 10-14) using the two socket head screws.

5. Planetary Upper Extension (4, Fig. 10-14).

A. If it is necessary to remove the upper extension, be sure to seal the gasket with Permatex #2 when reassembling.

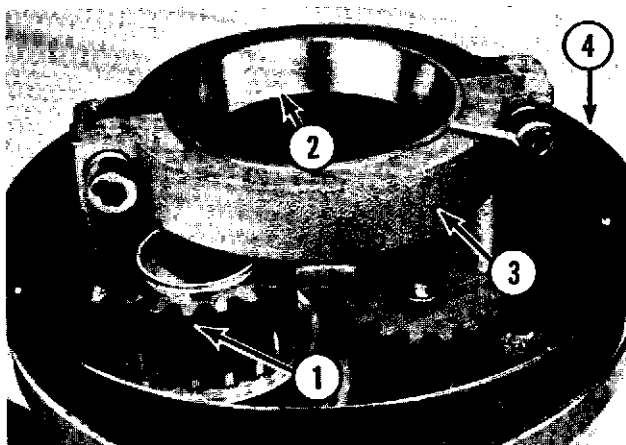


Fig. 10-14

6. Planetary Oil Pump.

The oil pump provides lubrication to the internal gear, pinion and to the upper planetary bearing. Check the oil pump inlet (1, Fig. 10-15) and outlet (2, Fig. 10-15) holes to see that they are not clogged. With oil in the planetary cavity a small amount of it should flow from the outlet tube when the drive gear is turned counterclockwise by hand.

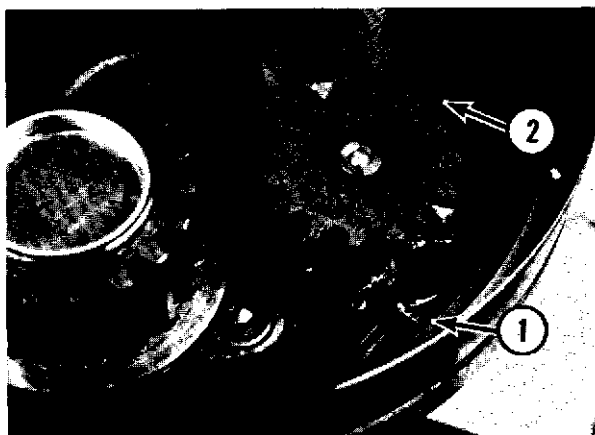


Fig. 10-15

Should it be necessary to disassemble the oil pump, use the following procedure.

A. Remove the oil pump by removing the two mounting screws.

B. Remove the two screws that hold the top plate, body and bottom plate together.

C. Drive the pin (1, Fig. 10-16) from the shaft if it is necessary to remove the gear.

D. Drive the pin from the hub (2, Fig. 10-16) of the drive gear if it is necessary to replace the drive gear.

E. Clean all parts before reassembling the oil pump.

F. Assemble the top plate, body and bottom plate as shown (Fig. 10-16). Oil pump inlet (1, Fig. 10-15) must point toward the outside of the planetary.

G. Install the oil pump in the planetary.

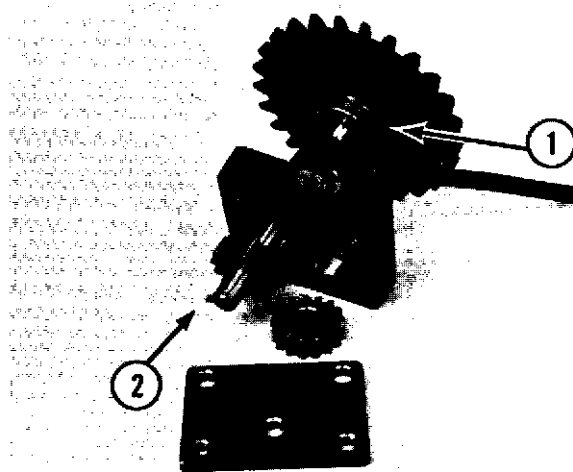


Fig. 10-16

7. Internal Gear.

- A. With the planetary removed from the mixer, loosen the six socket head screws (1, Fig. 10-17) that holds the internal gear in the transmission case.
- B. Remove the internal gear.
- C. Before installing the internal gear be sure that the housing gear seat is clean.
- D. Coat the top side of the internal gear with a thin coat of Permatex.
- E. Install the gear so the two drip cup retaining screw holes are located at the sides of the mixer.
- F. Install the six socket head screws.

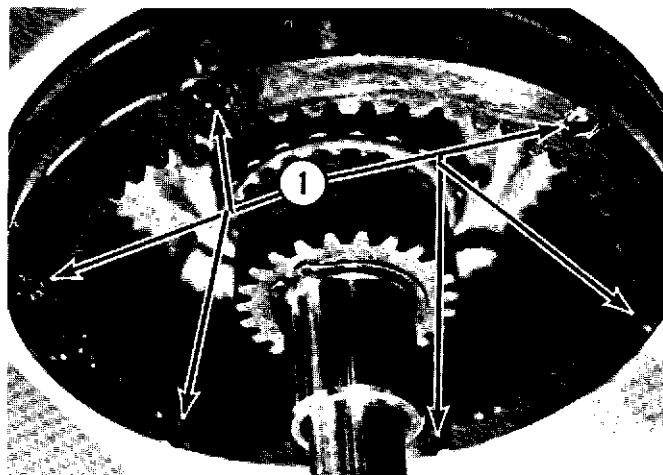


Fig. 10-17

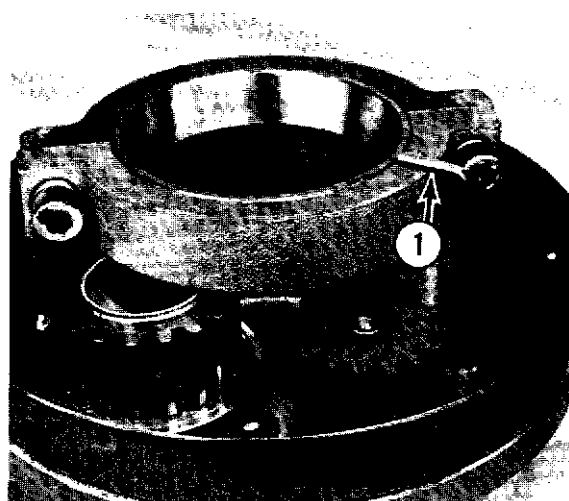


Fig. 10-18

8. Installing the Planetary.

- A. Install the bowl and place a 2" x 4" board across the top of the bowl.

NOTE: Position the oil pump outlet as shown in (1, Fig. 10-18).

- B. Support the planetary on the 2" x 4" board (Fig. 10-19) and slowly raise the bowl. Carefully mesh the fiber oil pump drive gear with the internal gear to prevent damage to the fiber gear.

NOTE: The agitator pinion must mesh with the internal gear and sun gear.

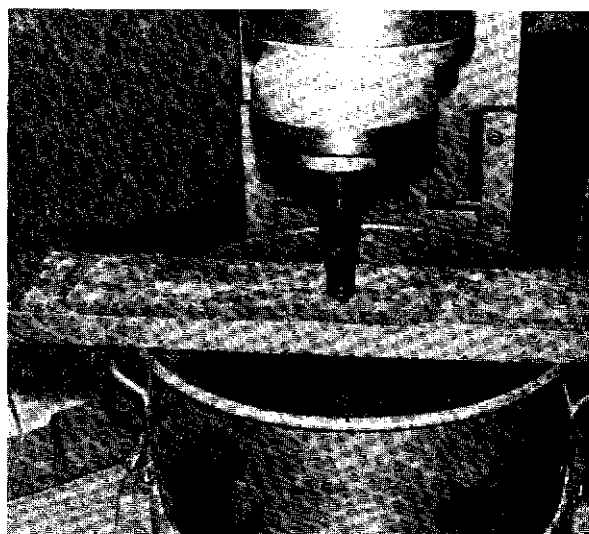


Fig. 10-19

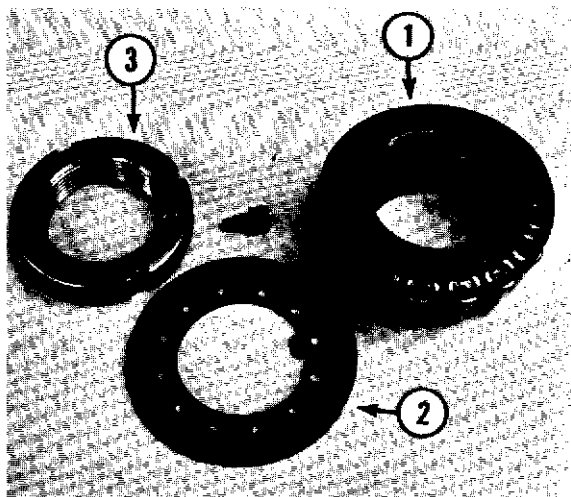


Fig. 10-20

- C. Install the bearing (1, Fig. 10-20), tongue washer (2, Fig. 10-20) and the locknut (3, Fig. 10-20).
- D. With the planetary fully up, tighten the locknut. There should be a slight amount of end play.
- E. Position the locknut so the dog point of the special socket head screw will enter one of the holes in the tongue washer. Tighten the special socket head screw (1, Fig. 10-21).

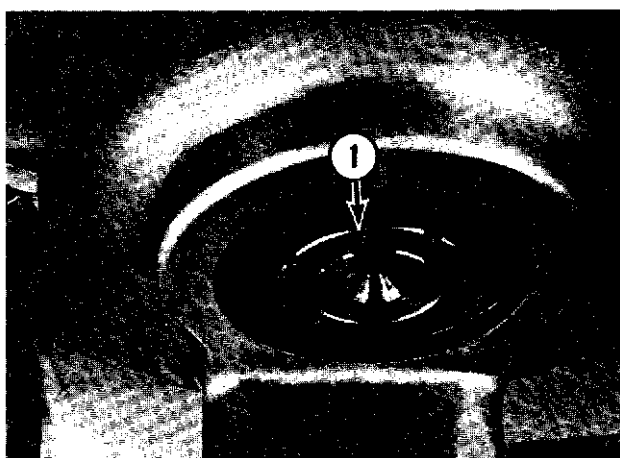


Fig. 10-21



Fig. 10-22

- F. Inspect the "O" ring (1, Fig. 10-22) on the seal cap, replace if necessary. Install the "O" ring and seal cap.
- G. If V-1401, install the bearing plate and tighten the six hex head bolts.
- H. If V-1401, install the bearing plate cover.

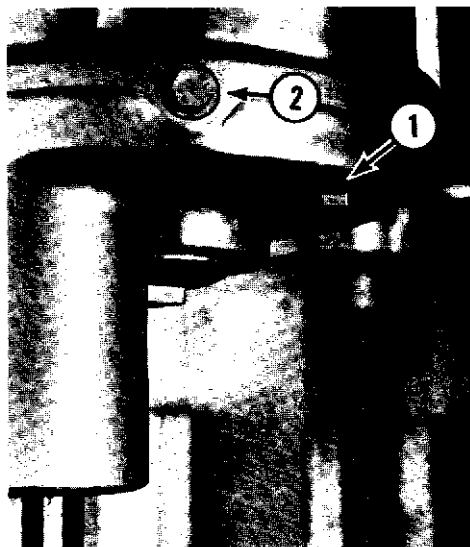


Fig. 10-23

- I. Install the drain plug (1, Fig. 10-23) and remove the fill plug (2, Fig. 10-23). Service the planetary with oils (Refer to the "Lubrication Chart" for the correct type of oil). Planetary is full when the oil just runs back out the fill hole. Install the fill plug.
- J. Install the drip cup.

SECTION 11 TRANSMISSION

1. Disassembling the Transmission.

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING WORKED ON.

- A. Drain the oil from the transmission and the planetary. Refer to Section 6 "Lubrication" for instructions.
- B. Remove the planetary. Refer to Section 10 "Planetary" for instructions.

NOTE: The planetary only needs to be removed if the planetary shaft is to be removed.

- C. Remove the brake assembly. Refer to Section 9 "Clutch and Brake" for instructions.
- D. Remove the clutch as a unit. Refer to Section 9 "Clutch and Brake" for instructions.
- E. Remove the bowl lift "V" belt.
- F. Remove the driven gear.
- G. Unscrew the clutch handle (1, Fig. 11-1).
- H. Remove the switch plate (2, Fig. 11-1). Do not lose the switch push buttons (1, Fig. 11-2).

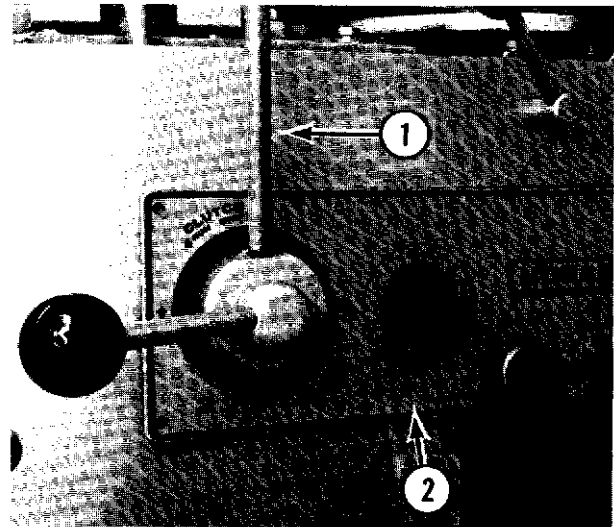


Fig. 11-1

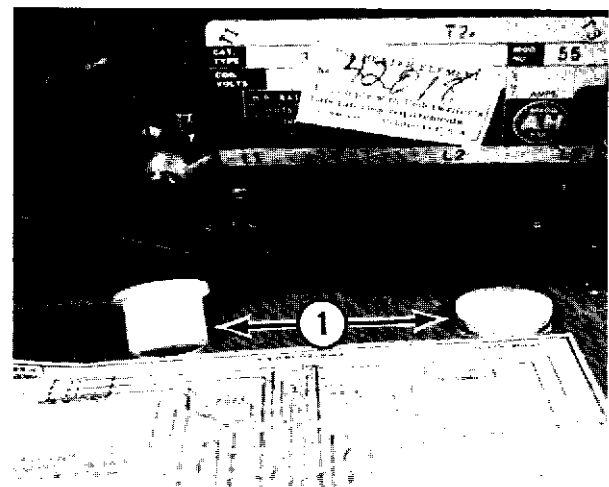


Fig. 11-2

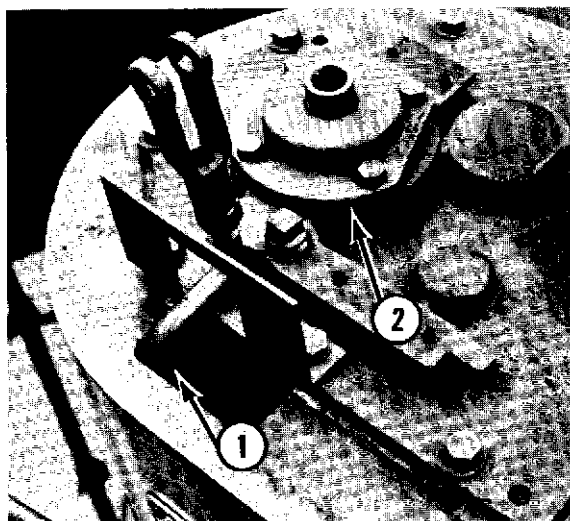


Fig. 11-3

- I. Disconnect the clutch rod (1, Fig. 11-3) from the hub.
- J. Remove the four screws and take out the shifter unit.
- K. Remove the upper bearing retainer (2, Fig. 11-3).
- L. With a punch, disengage the locking tab from the locknut (1, Fig. 11-4) on the planetary shaft.
- M. Remove the locknut and the lockwasher.

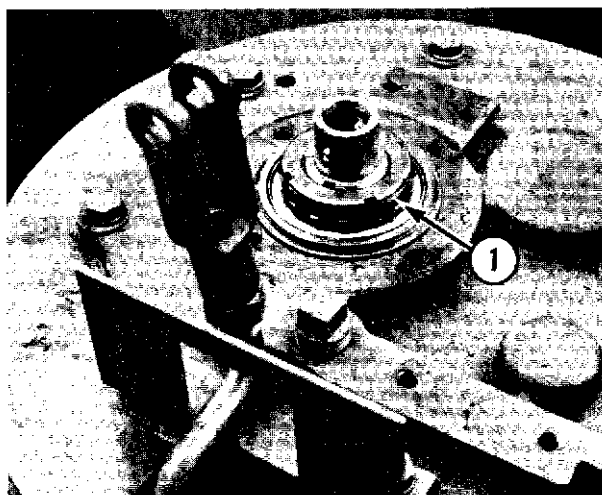


Fig. 11-4

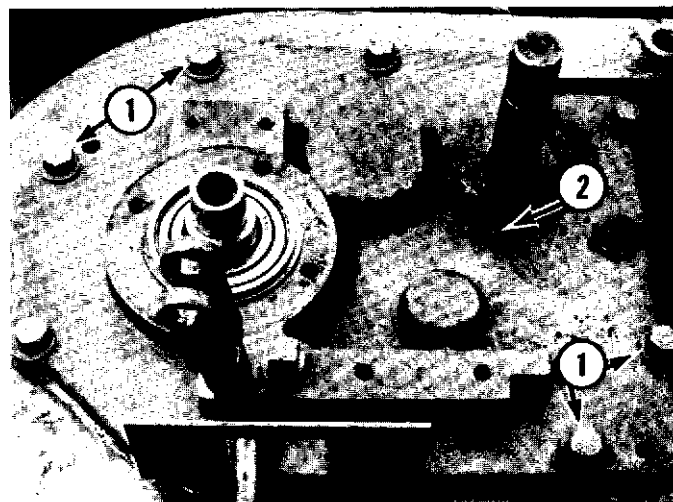


Fig. 11-5

- N. Remove the eleven hex head transmission cover mounting bolts and washers (1, Fig. 11-5).
- O. Carefully pry off the transmission case cover (2, Fig. 11-5).
- P. Remove the bearing from the clutch shaft (1, Fig. 11-6).
- Q. Lift off the spacer (2, Fig. 11-6), upper planetary gear (3, Fig. 11-6) and key.

NOTE: It should be noted that although the upper planetary gear is reversible, it should be reinstalled with the same side up. Mark the top side of the gear before removing it.

- R. Insert a punch through the hole in the shifter shaft (4, Fig. 11-6) and pull the shaft up to remove it.
- S. Remove the shifters (5, Fig. 11-6).
- T. Remove the clutch shaft assembly (6, Fig. 11-6) and main shaft assembly (7, Fig. 11-6) at the same time.

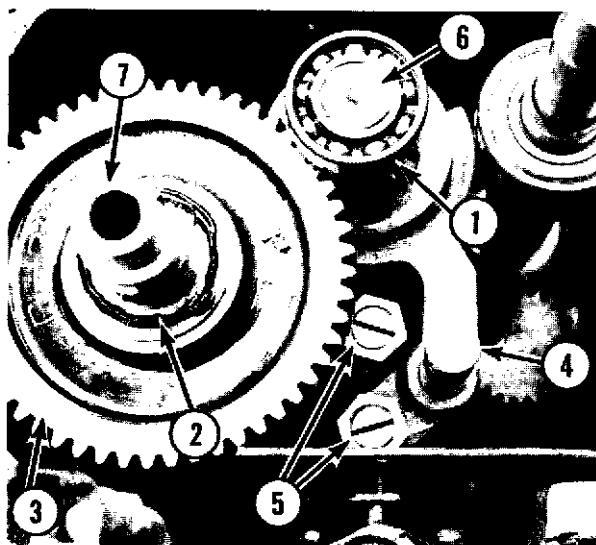


Fig. 11-6

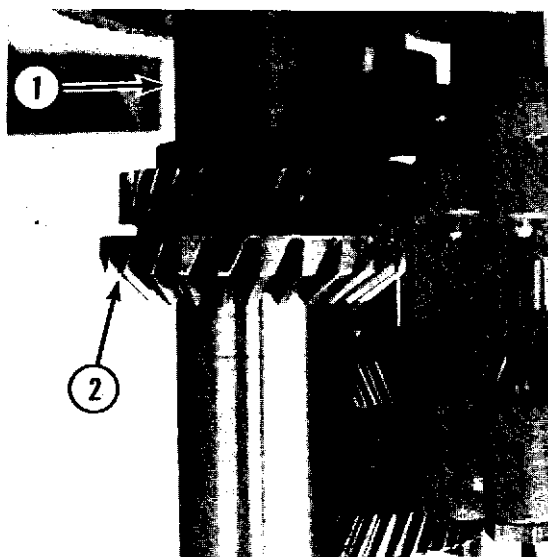


Fig. 11-7

- U. Remove the spacer (1, Fig. 11-7) and gear cluster (2, Fig. 11-7) from the planetary shaft.

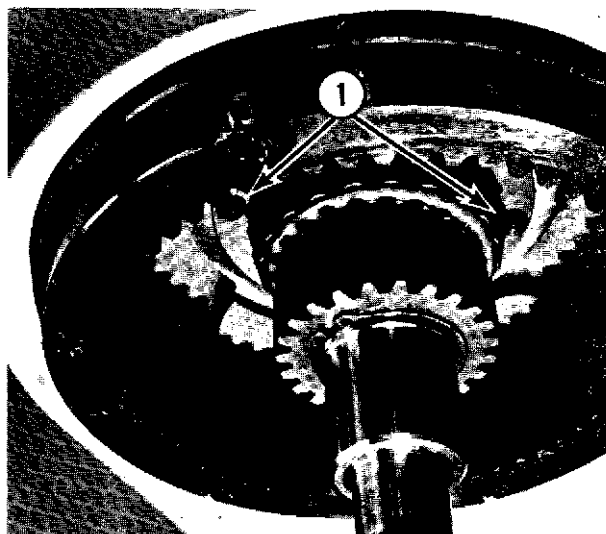


Fig. 11-8

- V. Remove the six screws (1, Fig. 11-8) from the lower planetary shaft bearing retainer. Do not let the planetary shaft fall out the bottom of the mixer.
- W. Remove the planetary shaft down through the housing.
- X. The chimney (1, Fig. 11-9) can now be removed.

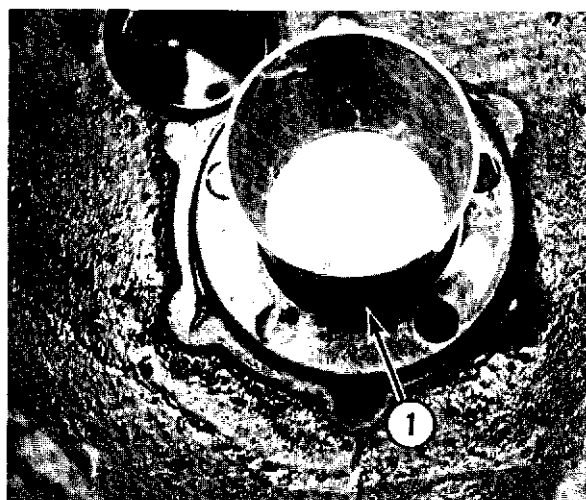


Fig. 11-9

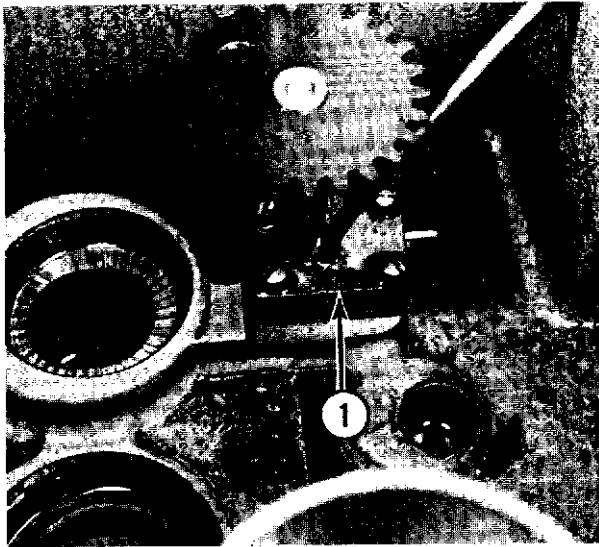


Fig. 11-10

- Y. The oil pump (1, Fig. 11-10) can be removed if necessary.
- Z. The attachment hub bevel pinion and square drive sleeve assembly can be removed after the chimney has been removed.

2. Main Drive Shaft Disassembly.

NOTE: Although the gears are reversible, they should be reinstalled with the same side up; mark the top side of the gears when taking them off.

- A. The upper ball bearing (1, Fig. 11-11) can be removed from the top of the shaft if necessary.
- B. To remove the gears, take off the retaining ring (2, Fig. 11-11) from the lower end of the shaft.
- C. Remove the lower bearing (3, Fig. 11-11).
- D. Slip off the 17T lower gear (4, Fig. 11-11), spacer (5, Fig. 11-11) and woodruff key (6, Fig. 11-11).
- E. Remove the 25T upper gear (7, Fig. 11-11) and woodruff key (8, Fig. 11-11).

3. Main Drive Shaft Assembly.

- A. Carefully clean and inspect each part. Replace any worn parts.
- B. Install the upper woodruff key (8, Fig. 11-11).
- C. Install the 25T upper gear (7, Fig. 11-11) with the same side up as when it was removed.

MAIN DRIVE SHAFT

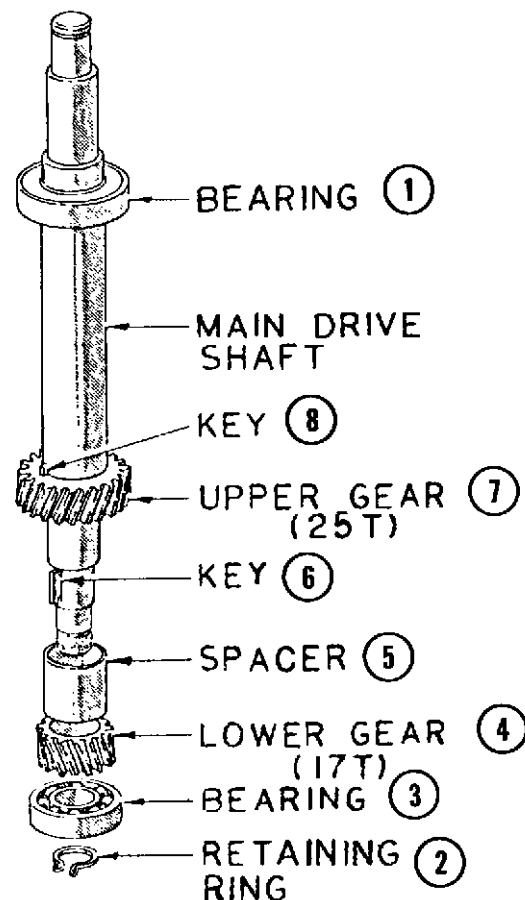
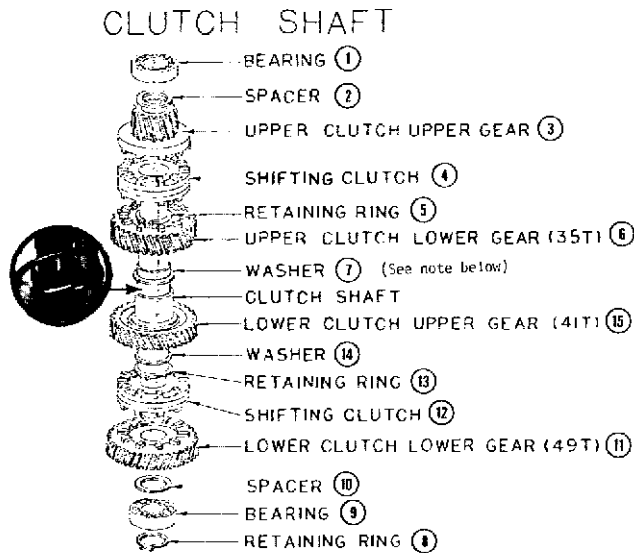


Fig. 11-11

- D. Install the spacer (5, Fig. 11-11) and the lower woodruff key (6, Fig. 11-11).
- E. Install the 17T lower gear (4, Fig. 11-11) with the same side up as when it was removed.
- F. Install the bearing (3, Fig. 11-11) and the retaining ring (2, Fig. 11-11).
- G. Install the upper bearing (1, Fig. 11-11), if it was removed.



NOTE: The washer must be installed with the groove against the shoulder on the shaft.

Fig. 11-12

4. Clutch Shaft Disassembly. (Fig. 11-12).

NOTE: Some of the gears and clutches can be reinstalled in different locations and with the opposite side up. Mark the top side of the gears and clutches and also note the location from which they were removed. When reinstalling the gears and clutches they should be returned to their original position.

- A. Remove the upper ball bearing (1) and spacer (2).
- B. Remove the upper clutch upper gear (3).
- C. Remove the shifting clutch (4).
- D. Remove the retaining ring (5).
- E. Remove the upper clutch lower gear (35T) (6) and washer (7).
- F. Remove the retaining ring (8), ball bearing (9) and the spacer (10).
- G. Remove the lower clutch lower gear (49T) (11).
- H. Remove the shifting clutch (12).
- I. Remove the retaining ring (13), washer (14) and the lower clutch upper gear (41T) (15).

5. Clutch Shaft Assembly. (Fig. 11-12).

- A. Carefully clean and inspect each part. Replace any worn parts.

NOTE: Using Gearep #140, lightly lubricate the clutch shaft, clutch splines and gears before starting reassembly.

- B. Install the lower clutch upper gear (41T) (15), washer (14) and retaining ring (13) on the lower end of the clutch shaft.

NOTE: Lower end of the clutch shaft has a retaining ring groove.

- C. Install the lower shifting clutch (12). The shifting clutch should be installed with the same side up as when it was removed.

NOTE: The shifting clutch should be free to slide up and down on the spline. Should a shifting clutch seem to bind, take it off, turn it to a new position and check it again.

- D. Install the lower clutch lower gear (49T) (11), spacer (10), bearing (9) and the retaining ring (8).

- E. Install the (special) washer (7).

NOTE: The washer has a groove cut into the lower side and must be put on the shaft with the groove next to the shoulder on the shaft.

- F. Install the upper clutch lower gear (35T) (6).

- G. Install the retaining ring (5).

- H. Install the upper shifting clutch (4). The shifting clutch should be reinstalled with the same side up as when it was removed.

NOTE: The shifting clutch should be free to slide up and down on the splines. Should a shifting clutch seem to bind, take it off, turn it to a new position and check it again.

- I. Install the upper clutch upper gear (3) and spacer (2).

- J. Put the bearing (1) aside, it will be installed after the clutch shaft has been installed in the transmission case.

PLANETARY SHAFT

6. Planetary Shaft Disassembly.

- A. Remove the retaining ring (1, Fig. 11-13).
- B. Remove the sun gear (2, Fig. 11-13) and the key.
- C. Remove the roller bearing (3, Fig. 11-13) and the lower bearing lower spacer (4, Fig. 11-13).
- D. Remove the ball bearing (5, Fig. 11-13) and the lower bearing upper spacer (6, Fig. 11-13).

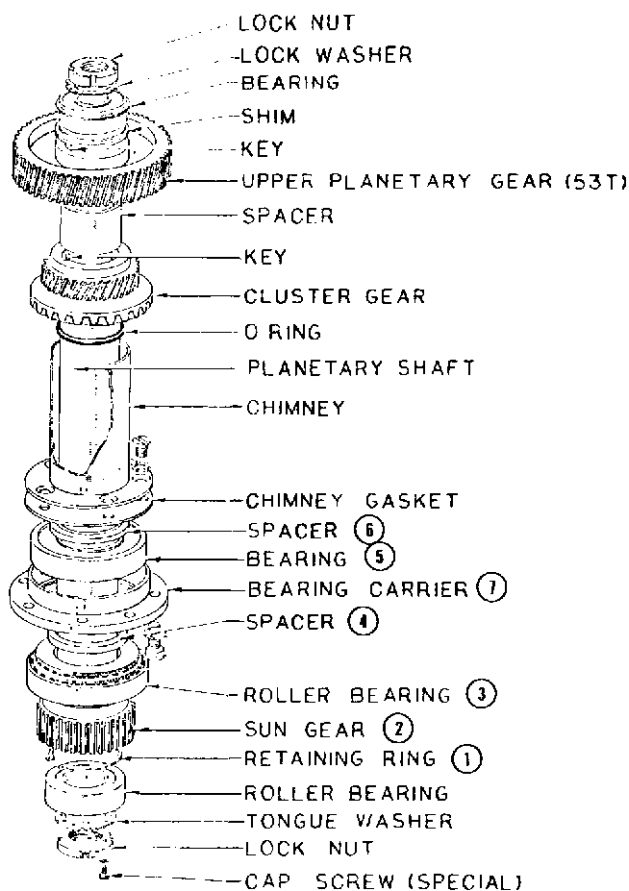


Fig. 11-13

7. Planetary Shaft Assembly.

- A. Clean and inspect each gear and bearing, replace if necessary.
- B. Install the lower bearing upper spacer (6, Fig. 11-13).
- C. Install the ball bearing (5, Fig. 11-13) and the bearing carrier (7, Fig. 11-13).
- D. Install the lower bearing lower spacer (4, Fig. 11-13) and the roller bearing (1, Fig. 11-14).
- E. Install the key (2, Fig. 11-14) and the sun gear (3, Fig. 11-14). (Collar toward the bearing.)
- F. Install the retaining ring (1, Fig. 11-13).

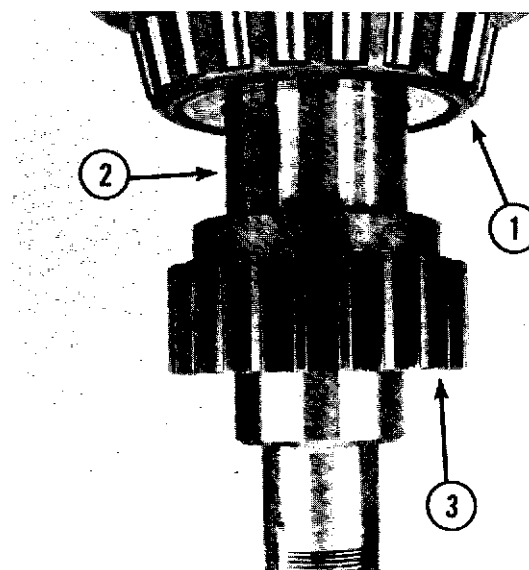


Fig. 11-14

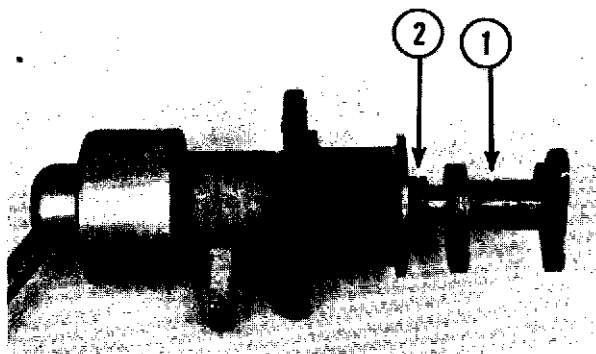


Fig. 11-15

8. Speed Selector Disassembly.

- A. Drive the rollpin out of the cam assembly (1, Fig. 11-15).
- B. Drive the rollpin out of the hub and cam assembly (2, Fig. 11-15).
- C. Remove the hub and cam assembly. Do not lose the two balls and detent springs.
- D. Remove the gear shift handle and shaft (1, Fig. 11-16) from the bracket.
- E. If necessary, the handle can be removed from the shaft by driving out the rollpin (2, Fig. 11-16).

9. Assembly.

- A. Inspect, and replace if necessary the "O" ring (3, Fig. 11-16).
- B. Insert the gear shift handle and shaft into the clutch hub and bracket as shown in Fig. 11-16.

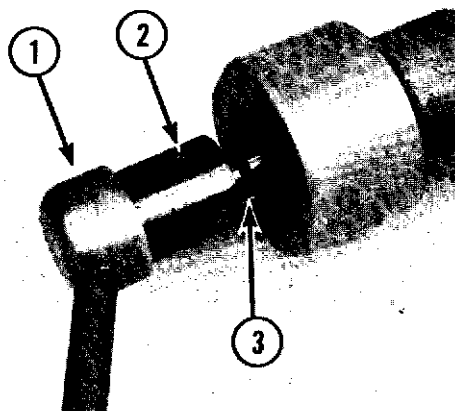


Fig. 11-16

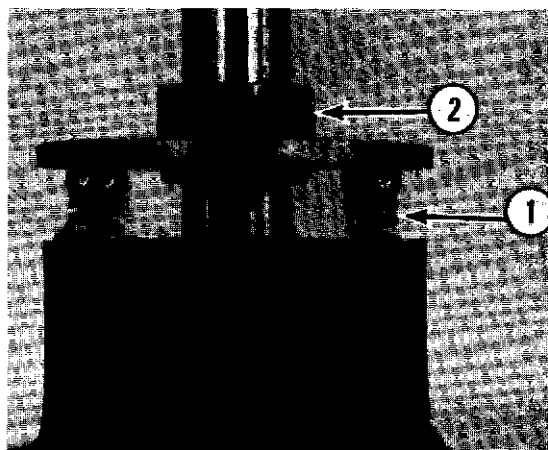


Fig. 11-17

- C. Place the springs in the holes and place the detent balls on the springs (1, Fig. 11-17).
- D. Install the cam assembly (2, Fig. 11-17) and secure with the rollpin.
- E. Install the cam as shown in Fig. 11-18 and secure with the rollpin. [Handle (1, Fig. 11-18) to the right and the high side of the cam (2, Fig. 11-18) facing up.]

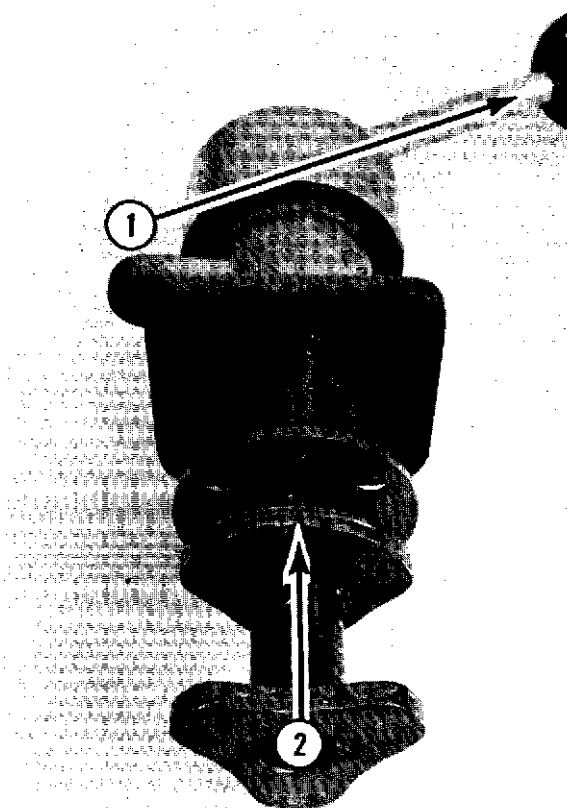


Fig. 11-18

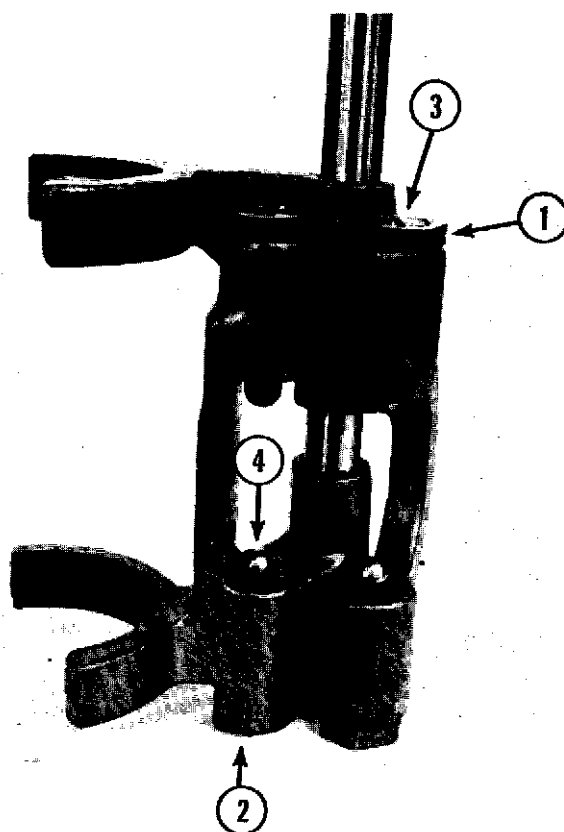


Fig. 11-19

10. Shifting Yokes.

The upper and lower shifting yokes each have two adjustable spring loaded plungers that provide flexible shifting. When the adjustment is not correct and the shifter handle is moved to a different speed, the clutches will "hang" in the previous speed. Should adjustment of the plungers be required, use the following steps. Check all four plungers.

- A. Loosen the locknut (1, Fig. 11-19). [Remove the cotter pin (2, Fig. 11-19) on bottom of lower yoke.]
- B. Adjust the screw (3, Fig. 11-19) so the total movement of the plunger (4, Fig. 11-19) is between $1/4"$ to $7/32"$ and tighten the locknut or replace the cotter pin.
- C. Repeat the adjustment procedure on the other three plungers.

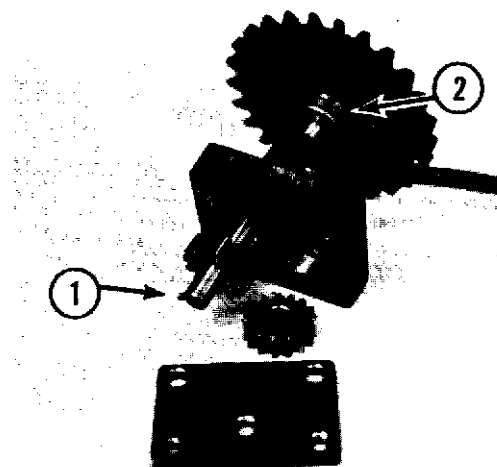


Fig. 11-20

11. Oil Pump.

The oil pump provides lubrication to the bearings, gears and clutches in the transmission. Check the oil pump inlet and delivery tubes holes to see that they are not clogged. Place the oil pump in a pan of oil with the oil level above the inlet tube. Rotate the driven gear counterclockwise, oil should flow from the delivery tubes.

Should it be necessary to disassemble the oil pump, use the following procedure.

- A. Remove the two screws that holds the top plate, body and bottom plate together.
- B. Remove the pin (1, Fig. 11-20) from the shaft if it is necessary to remove the gear.
- C. Drive the pin from the hub (2, Fig. 11-20) of the drive gear if it is necessary to replace the drive gear.
- D. Clean all parts before reassembling the oil pump.
- E. Assemble in the reverse order of disassembly.

NOTE: When installing the oil pump in the transmission gear case, check that the oil pump delivery tube is positioned above, but not touching the upper planetary gear.

12. Attachment Hub. (Optional)

- A. To remove the attachment hub, remove the four bolts, and withdraw the unit out through the front of the mixer.

NOTE: The shim washer provides correct meshing of the bevel pinion and the cluster bevel gear. Save the shim washer for re-assembly.

13. Assembling the Transmission.

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING WORKED ON.

Before reassembling the transmission, thoroughly clean the gear case. If there has been breakage or wear of any parts, be especially careful with the cleaning. Bearing seats in both the case and the case cover must be clean.

Clean each gear, spacer, key, retaining ring and bearing. Reassemble the main drive shaft, clutch shaft, planetary shaft, shifting yokes, oil pump and attachment hub. Lay the assembled units on a clean cloth.

- A. Assuming that the transmission has been completely disassembled, coat the attachment hub sealing surface with Permatex #2.
- B. Install the attachment hub (4 screws).
- C. Coat the chimney gasket with Permatex (both sides) and place it on the transmission housing. Install the chimney (1, Fig. 11-21) (5 screws).

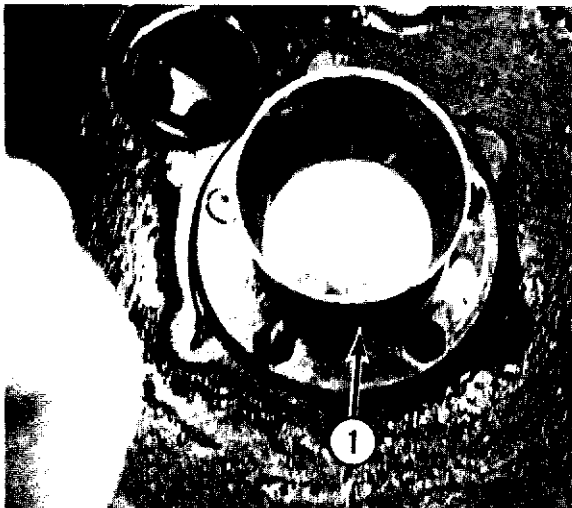


Fig. 11-21

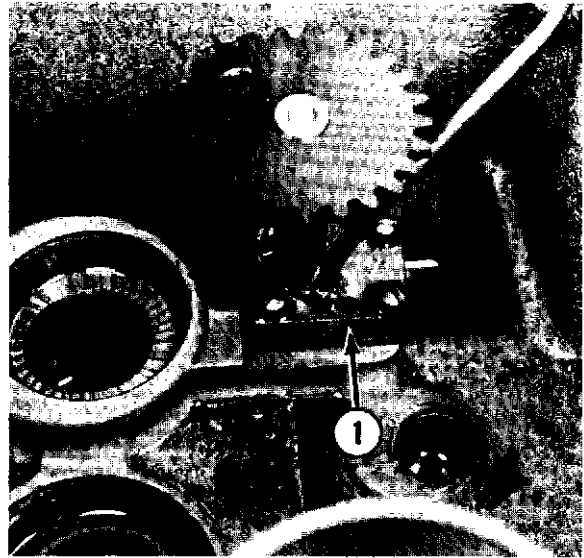


Fig. 11-22

- D. Install the oil pump (1, Fig. 11-22).
- E. Insert the partially assembled planetary shaft from the bottom of the transmission case. Secure with the six Allen head screws.
- F. Install the main drive shaft (1, Fig. 11-23).

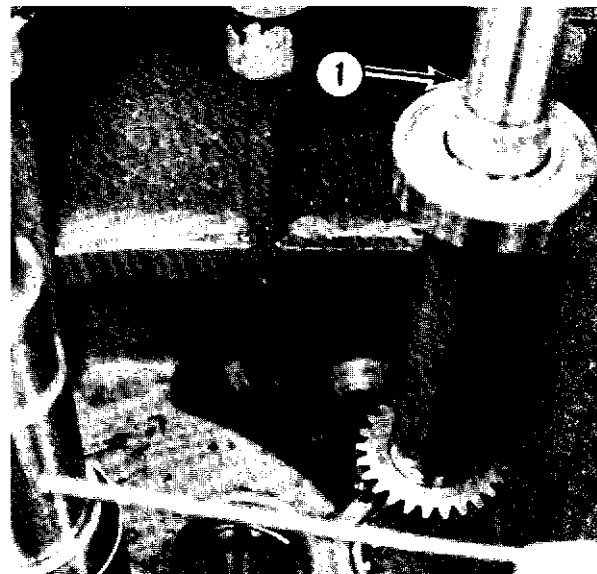


Fig. 11-23

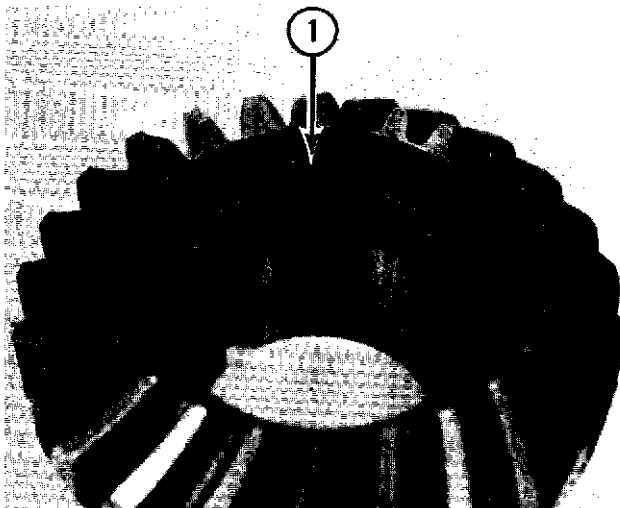


Fig. 11-24

- G. Inspect the "O" ring (1, Fig. 11-24) in the gear cluster, replace if worn.
- H. Install the key, gear cluster (1, Fig. 11-25) and spacer (2, Fig. 11-25).
- I. Raise the main drive shaft slightly and install the clutch shaft. Both shafts can now be lowered into place.

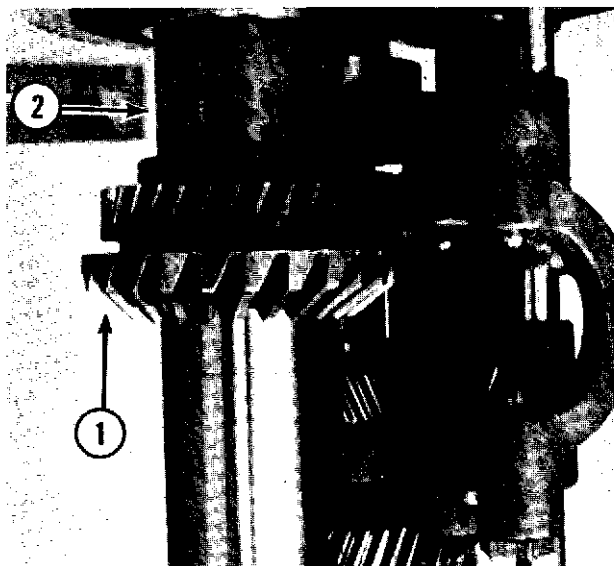


Fig. 11-25

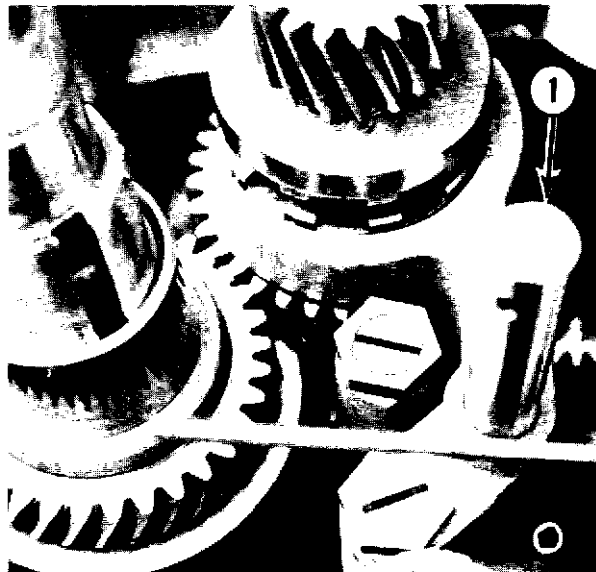


Fig. 11-26

- J. Install the upper and lower shifting yokes and insert the shifter shaft (1, Fig. 11-26).
- K. Install the key and the upper planetary gear (1, Fig. 11-27) with the top (marked) side up.
- L. Install the shim (2, Fig. 11-27) with the shoulder side up.
- M. Install the spacer and the upper ball bearing (3, Fig. 11-27) on the clutch shaft.

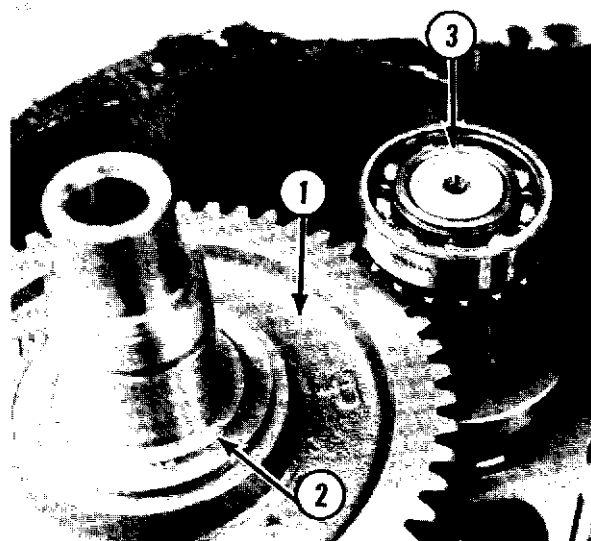


Fig. 11-27

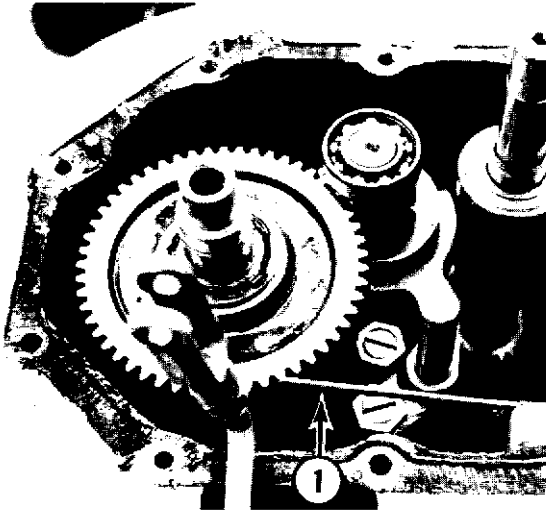


Fig. 11-28

NOTE: Before replacing the top cover, check that the oil pump delivery tube (1, Fig. 11-28) is positioned above, but not touching the upper planetary gear.

- N. Apply Permatex #2 to the sealing surface on the top cover and carefully seat the top cover over the two dowels that locate it on the housing and install the 11 bolts.
- O. Install the lockwasher (1, Fig. 11-29) and lock-nut (2, Fig. 11-29). Tighten the locknut and lock the position with a tab on the lockwasher.
- P. Install the upper bearing retainer.

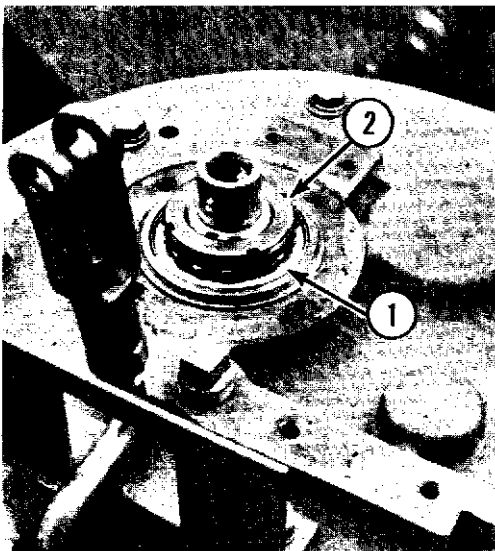


Fig. 11-29

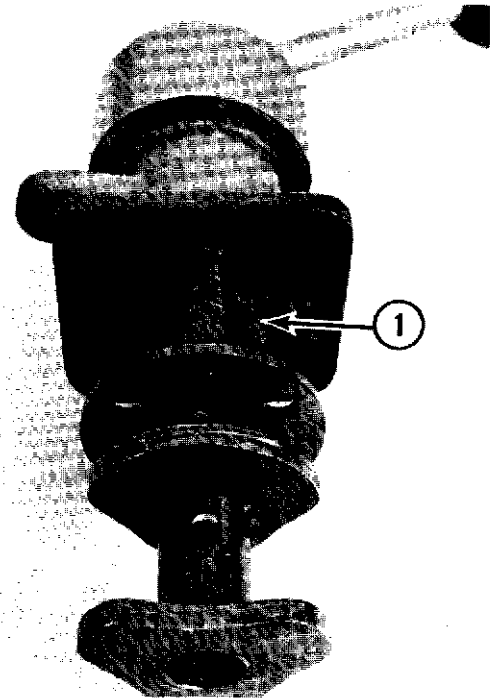


Fig. 11-30

- Q. Place the gear shift handle to the 3rd speed position. Locate the bracket with the oil hole (1, Fig. 11-30) in the up position.
- R. Apply Permatex #2 to the sealing surface and install the shifter unit.
- S. Connect the clutch rod to the hub.

- T. Place the push buttons (1, Fig. 11-31) in the switch plate, and install the switch plate.
- U. Install the clutch handle.
- V. Install the driven gear and spline hub. Use the same size and number of shim washers as was removed and secure with the retaining ring.
- W. Install the bowl lift "V" belt and the Flexa-Gear. (Refer to Section 7 for adjustment procedure.)
- X. Install the clutch. Refer to Section 9 "Clutch and Brake" for instructions.
- Y. Install the brake. Refer to Section 9 "Clutch and Brake" for instructions.
- Z. Install the planetary. Refer to Section 10 "Planetary" for instructions.
- AA. Service the planetary and transmission with oil. Refer to Section 6 "Lubrication" for instructions.
- BB. Test the operation of the mixer and reinstall the cover.

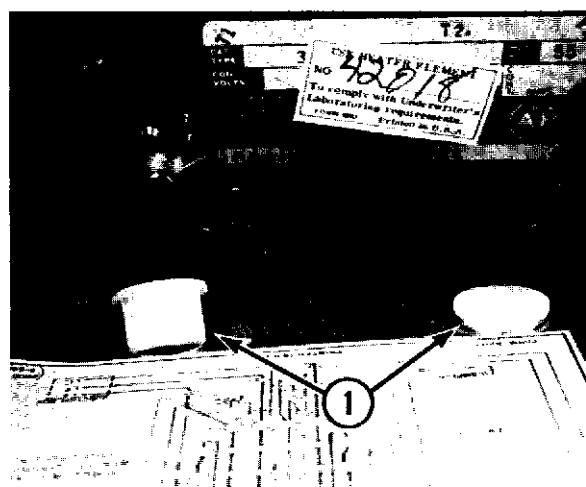
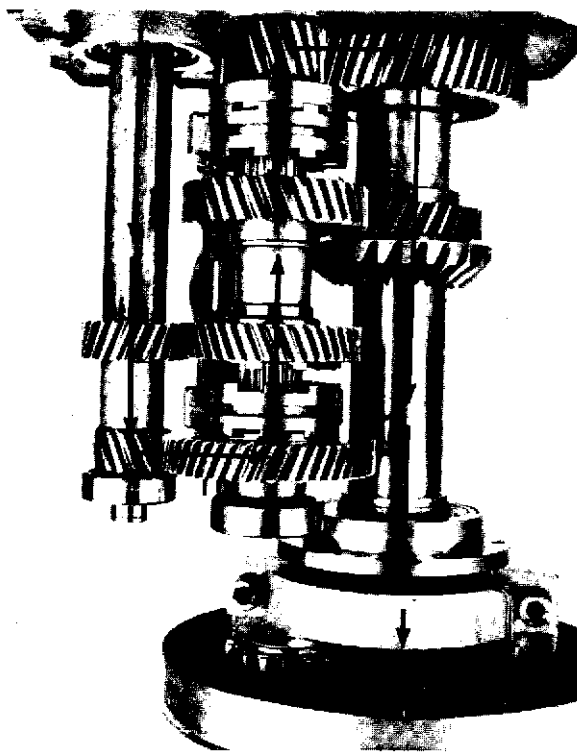
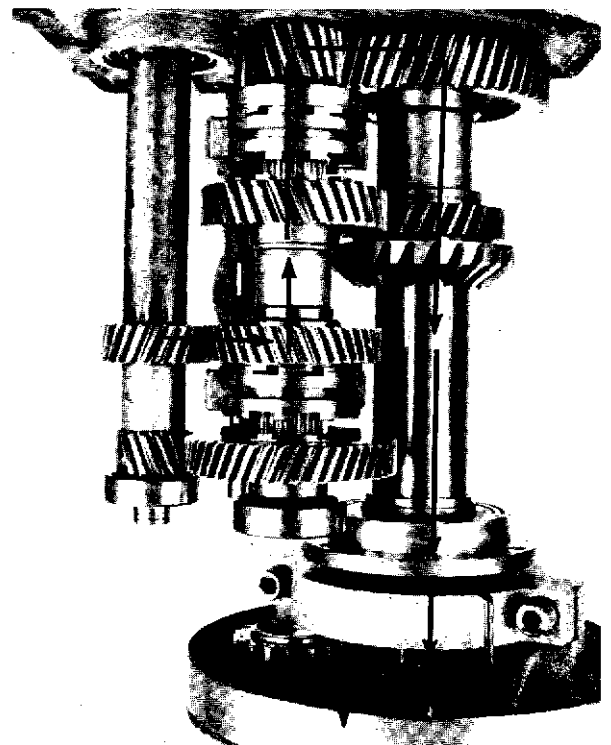


Fig. 11-31

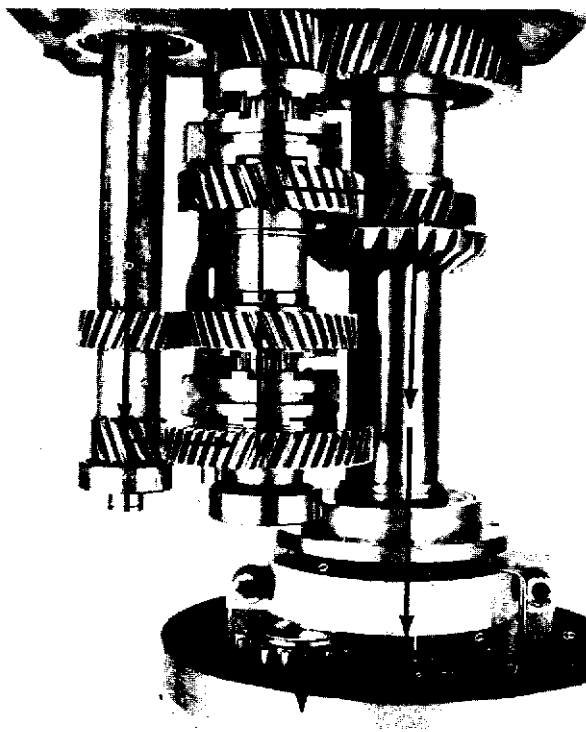
14. Power Flow (Fig. 11-32).



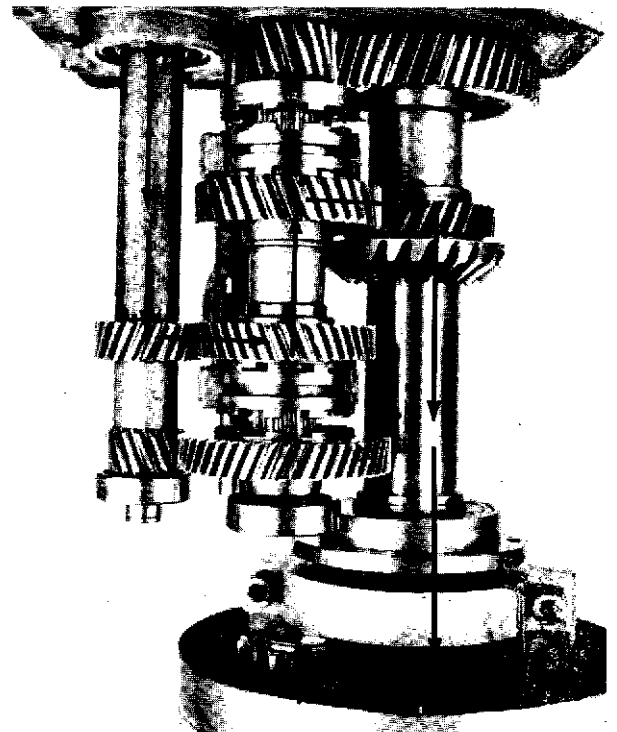
1st Speed



2nd Speed



3rd Speed



4th Speed

Fig. 11-32

SECTION 12

POWER BOWL LIFT

1. "V" Belt Replacement.

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING WORKED ON.

- A. Remove the cotter pin (1, Fig. 12-1) and clevis pin (2, Fig. 12-1) from the brake and clutch arm.
- B. Remove the four bolts (3, Fig. 12-1) and lift the clutch shaft support (4, Fig. 12-1) from the mixer.
- C. Remove the Flexa-Gear.
- D. Loosen the holding screw (1, Fig. 12-2) and the pivot screw (2, Fig. 12-2). Release the belt tension.
- E. Remove the "V" belt (3, Fig. 12-2).
- F. Install the new "V" belt and reassemble in the reverse order of disassembly. Adjust the "V" belt tension as described in Adjustments "Bowl Lift "V" Belt".

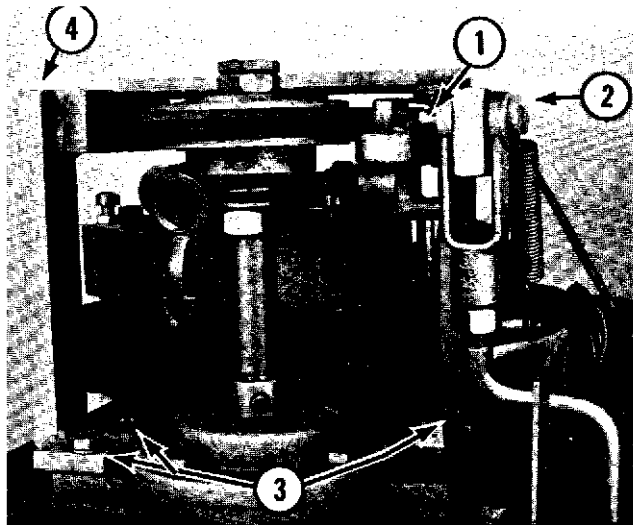


Fig. 12-1

2. Overload Slip Clutch. (4, Fig. 12-2).

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING WORKED ON.

The overload slip clutch is designed so that it will slip when the end of the bowl lift travel (either up or down) is reached.

A. Removal.

NOTE: When working on a M-802 remove the clutch as a unit. Also remove the driven gear. Refer to: Section 9 "Clutch". The V-1401 has greater clearance so it is not necessary to remove either the clutch or driven gear.

- (1) (V-1401) Remove the Flexa-Gear.
- (2) (V-1401) Loosen the holding screw (1, Fig. 12-2) and the pivot screw (2, Fig. 12-2). Release the "V" belt tension.

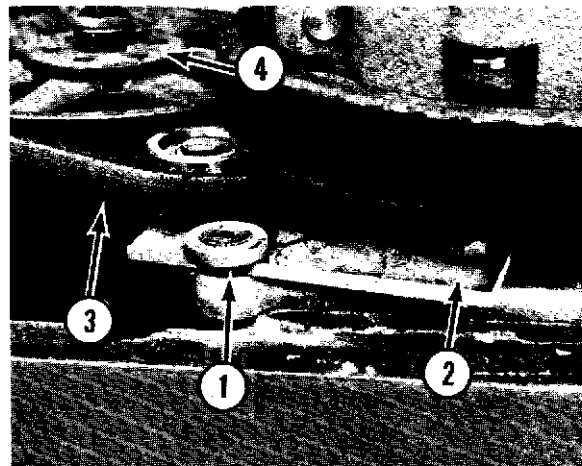


Fig. 12-2

- (3) (V-1401) Remove the "V" belt (3, Fig. 12-2) from the driven pulley.
- (4) Drive out the spirol pin (1, Fig. 12-3).
- (5) Slowly remove the palnut (2, Fig. 12-3).
- (6) Carefully lift off the detent plate (3, Fig. 12-3) and the balls (4, Fig. 12-3) and springs (5, Fig. 12-3).
- (7) Lift off the "V" pulley (6, Fig. 12-3).

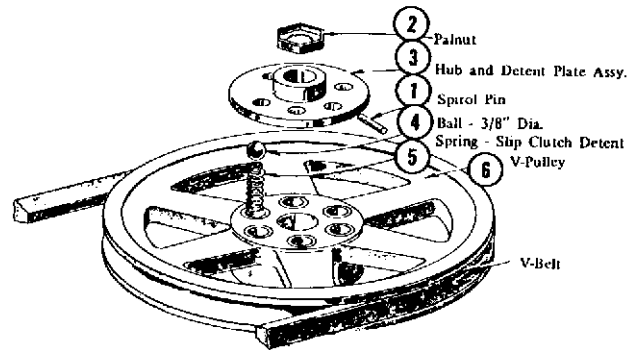


Fig. 12-3

B. Installing.

- (1) Place the V-pulley (6, Fig. 12-3) on the bowl lift gear box output shaft.
- (2) Place the springs (5, Fig. 12-3) into the holes in the V-pulley. Place a ball (4, Fig. 12-3) on each spring.
- (3) Inspect the detent plate (3, Fig. 12-3), replace it if it is worn.
- (4) Carefully lower the detent plate (3, Fig. 12-3) to rest on the balls and springs.
- (5) Install the palnut (2, Fig. 12-3) and turn it until the holes in the detent plate and input shaft are aligned.
- (6) Drive in the spirol pin (1, Fig. 12-3).
- (7) (M-802) Install the drive gear.
- (8) Install the "V" belt.
- (9) Adjust the "V" belt. (Refer to: Adjustments "Bowl Lift "V" Belt").
- (10) Install the Flexa-Gear.
- (11) (M-802) Reinstall the clutch. Refer to: Section 9 "Clutch and Brake".

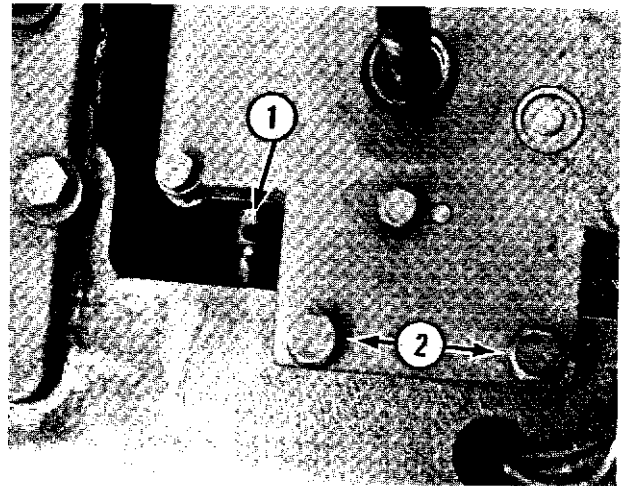


Fig. 12-4

3. Bowl Lift Gear Box.

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING WORKED ON.

A. Removal.

- (1) Remove the overload slip clutch. Refer to: Overload Slip Clutch "Removal".
 - (2) Drive the spirol pin (1, Fig. 12-4) out of the yoke shaft.
- NOTE:** Some mixers have a connector sleeve (Fig. 12-6) which does not require that the spirol pin be removed.
- (3) Remove the two hex head bolts (2, Fig. 12-4) and lift the gear box out of the mixer.

B. Disassembly.

- (1) Remove the six hex head bolts (1, Fig. 12-5).
- (2) Lift the cover off the gear box. (There are two dowels.)
- (3) Lift the input shaft (2, Fig. 12-5) out of the gear box.
- (4) Drive out the spirol pin (3, Fig. 12-5) from the output shaft.
- (5) Remove the output shaft assembly (4, Fig. 12-5).
- (6) Remove the retaining ring (5, Fig. 12-5) and remove the idler gear (6, Fig. 12-5).
- (7) Drive the spirol pin (7, Fig. 12-5) out of the detent plate (8, Fig. 12-5). Hold the detent plate while driving the pin to prevent the springs and balls (9, Fig. 12-5) from being lost.
- (8) Move the yoke shaft (10, Fig. 12-5) to the side, and remove the woodruff key (11, Fig. 12-5).
- (9) Withdraw the yoke shaft out of the gear box, while holding the yoke (12, Fig. 12-5).

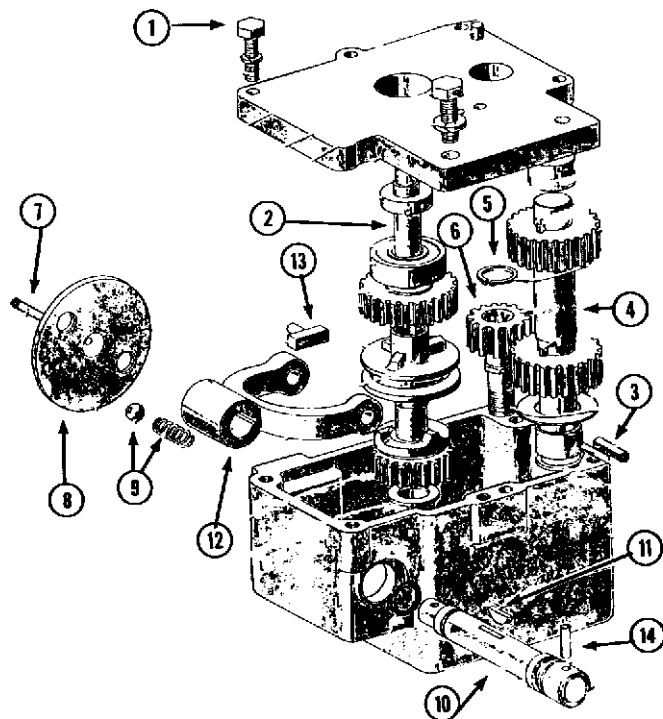


Fig. 12-5

C. Assembly.

- (1) Clean and inspect each gear, bearing, "O" ring, shoe and the gear box, replace if necessary.
- (2) Insert the yoke shaft (10, Fig. 12-5) into the yoke (12, Fig. 12-5) and the gear box.
- (3) Move the yoke shaft (10, Fig. 12-5) to one side and install the woodruff key (11, Fig. 12-5).
- (4) Install the two springs and two balls (9, Fig. 12-5).
- (5) Place the detent plate (8, Fig. 12-5) in place and hold while installing the spirol pin (7, Fig. 12-5).
- (6) Install the idler gear (6, Fig. 12-5) and secure with the retaining ring (5, Fig. 12-5).
- (7) Assemble the output shaft (4, Fig. 12-5).
- (8) Install the output shaft (4, Fig. 12-5).
- (9) Drive the spirol pin (3, Fig. 12-5) into the output shaft.
- (10) Install the shoes (13, Fig. 12-5) into the yoke.
- (11) Assemble the input shaft (2, Fig. 12-5).
- (12) Install the input shaft. The shoes on the yoke must be aligned with the groove in the clutch as the input shaft is installed.
- (13) Pack the gear box with grease. Refer to Lubrication Chart for the amount and type of grease.
- (14) Apply Permatex #2 to the gear box cover.
- (15) Install the cover and secure with the six bolts and washers (1, Fig. 12-5).

D. Installing.

- (1) Align the bowl lift gear box output shaft spirol pin with the groove in the lift screw extension.
- (2) Lower the bowl lift gear box into place and secure with the two hex head bolts (2, Fig. 12-4).

NOTE: If the mixer is equipped with a connector sleeve like shown in Fig. 12-6 it will be necessary to align the spirol pin in the yoke shaft with the groove while lowering the gear box into place.

- (3) Push the lift control handle into place and drive the spirol pin (1, Fig. 12-4) into the shaft.
- (4) Install the overload slip clutch. Refer to: Overload Slip Clutch "Installing".

4. Bowl Lift Screw Extension.

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING WORKED ON.

- A. Remove the stainless steel apron.
- B. Lower the bowl lift to the lower stop.
- C. Drive out the spirol pin (1, Fig. 12-7) on the bowl lift screw.
- D. If the mixer is equipped with a safety screw, loosen the jam nut (1, Fig. 12-8) and back out the stop screw (2, Fig. 12-8).
- E. Remove the bowl lift gear box. Refer to: Bowl Lift Gear Box "Removal".

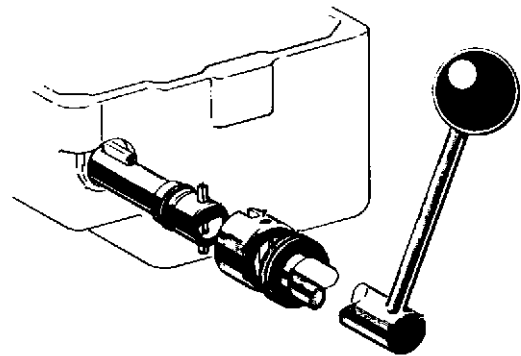
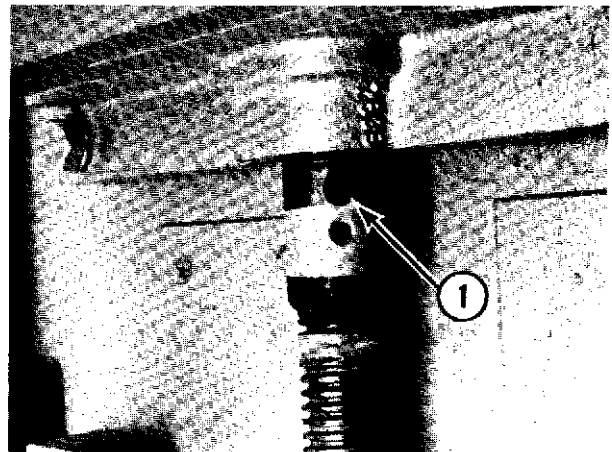
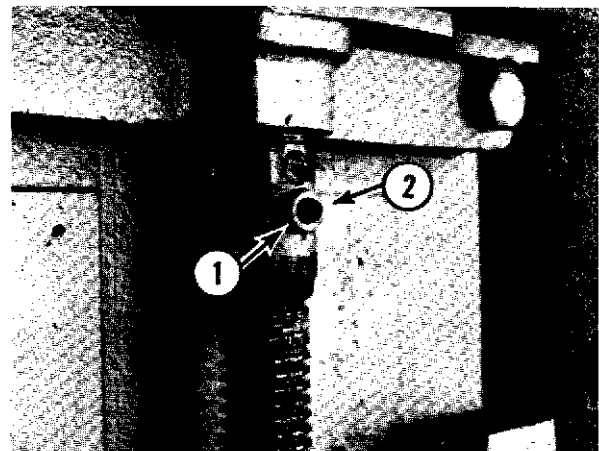
**Fig. 12-6****Fig. 12-7****Fig. 12-8**



Fig. 12-9

- F. Remove the lift screw extension shaft (Fig. 12-9) from the mixer.

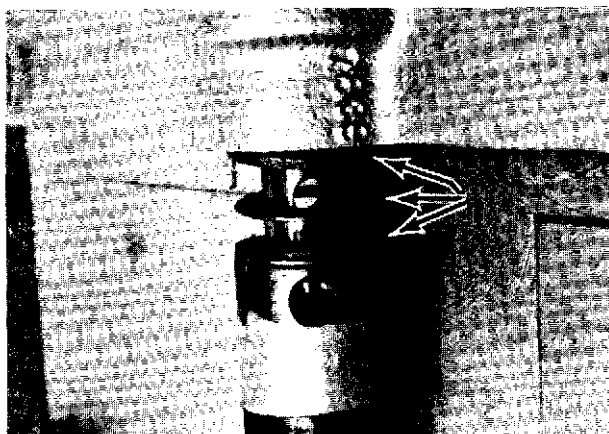


Fig. 12-10

- G. The thrust bearing (Fig. 12-10) can be removed from the top of the bowl lift screw.

NOTE: The thrust bearing is used to take the upward thrust of the bowl lift screw.

- H. Replace in reverse order of disassembly.

5. Bowl Lift Screw.

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING WORKED ON.

- A. Lower the bowl support to the lower stop.
- B. Remove the stainless steel apron.
- C. Drive the spirol pin (Fig. 12-7) out of the bowl lift screw.
- D. If the mixer is equipped with a safety screw, loosen the jam nut (1, Fig. 12-8) and back out the stop screw (2, Fig. 12-8).
- E. Rotate (by hand) the bowl lift screw a few turns to clear the lift screw extension and remove the thrust bearing (Fig. 12-10).
- F. Remove the two bolts (1, Fig. 12-11) in the nut retainer (2, Fig. 12-11).
- G. Remove the bowl lift screw (3, Fig. 12-11), the bowl lift nut (4, Fig. 12-11) and thrust bearing (5, Fig. 12-11).
- H. Reassemble in the reverse order of disassembly. Adjust the bowl to beater clearance. Refer to: Adjustments "Bowl to Beater Clearance".

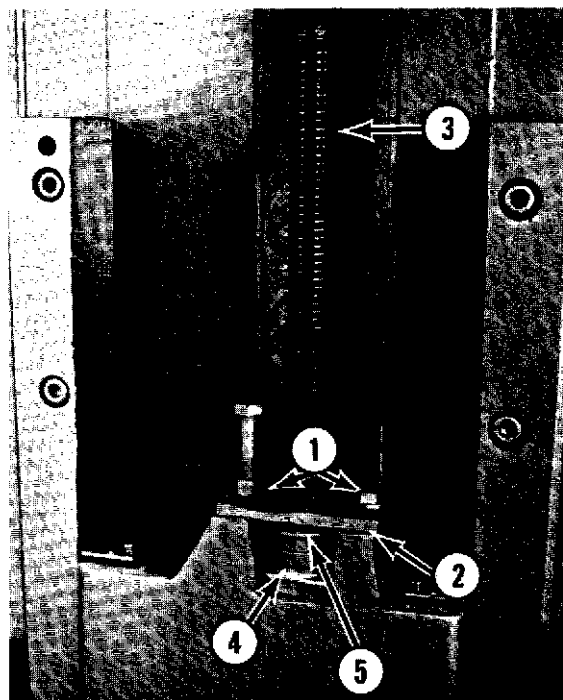


Fig. 12-11

6. Bowl Support.

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING WORKED ON.

A. Removal.

To remove the bowl support it is necessary to take off the right-hand slideway. Proceed as follows:

- (1) Remove the stainless steel apron.
- (2) Break the paint and body putty covering the heads of the three lower screws (A, B, C, Fig. 12-12) (Locate by dimensions given).
- (3) Run the bowl support all the way down and remove the bowl lift nut retainer (1, Fig. 12-11). Then run the nut back up the screw.
- (4) Take out the five screws (A, B, C, D, E, Fig. 12-12) and remove the right-hand slideway. The bowl support will then be clear of the bowl lift screw.

B. Installing.

- (1) If a new casting is installed, the fittings such as bowl clamps, locating studs and bowl retainer can be transferred from the discarded casting.
- (2) Clean and lubricate the grooves on the bowl support that fit into the slideways.
- (3) Lift the bowl support in place, with the groove in the left-hand slideway.
- (4) Install the right-hand slideway using bolt at the top (E, Fig. 12-12) and bottom (A, Fig. 12-12).
- (5) Install the remaining bolts, but do not tighten at this time.
- (6) Align the bowl lift nut in the bowl support and install the bowl lift nut retainer (1, Fig. 12-11).

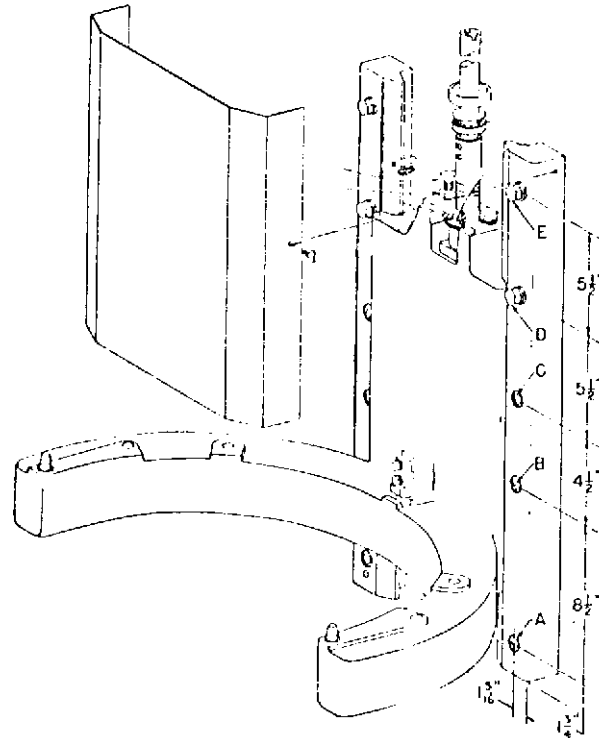


Fig. 12-12

- (7) Adjust the slideways. Refer to Adjustments "Slideways".
- (8) Install the stainless steel apron.

SECTION 13

TRANSMISSION HOUSING, PEDESTAL, BASE

1. Transmission Housing.

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING WORKED ON.

Should the transmission housing become broken or cracked, the housing must be replaced. In order to replace the housing, the mixer motor, bowl lift gear box, lift screw extension, transmission unit, internal gear, planetary and controls mounted on the housing must be removed. The transmission housing has two locating dowels and is held to the pedestal by five mounting bolts. Shims located behind the mounting bolts are used to align the transmission housing. Save all shims when removing the old transmission housing for use in aligning the new housing.

After the new transmission housing has been installed with the shims in place and the mounting bolts tight, check the clearance between the side of bowl and beater using the following procedure.

- A. Install the planetary shaft assembly.
- B. Install the transmission case cover and the planetary shaft upper locknut. Tighten the locknut to pull the planetary up to its normal position.
- C. Install the planetary.
- D. Place a bowl on the bowl support and install a "B" beater on the agitator shaft.
- E. Raise the bowl to the extreme up position and rotate the planetary by hand while checking the clearance between the side of the bowl and the beater. The clearance should be even at all points. Shims can be added or removed from between the transmission housing and pedestal to correctly align the transmission case.
- F. Complete installation of the assemblies removed from the mixer and recheck the alignment.

2. Pedestal.

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING WORKED ON.

Remove the transmission housing. Refer to "Transmission Housing". The pedestal is fastened to the base by four bolts and after removal of the transmission housing, it must be carefully laid on its side to remove the base. When reassembling, be sure the base is squared with the pedestal.

3. Base.

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING WORKED ON.

- A. When removal or replacement of the base is necessary, carefully lay the mixer on its side, opposite the controls.
- B. Elevate the lower part of the pedestal.
- C. Remove the four base mounting bolts and remove the base.
- D. Install the new base in the reverse order of disassembly.

SECTION 14

ELECTRICAL CONTROLS (SOLID STATE)

1. Operating Controls.

A. Stop Switch (1PB) (1, Fig. 14-1).

The stop switch is a magnetically operated reed switch. When the stop switch is in its normal position (not actuated) the reed switch on 1RMB (1, Fig. 14-2) behind the switch plate is held closed by the magnet and allows the machine to be started. When the stop switch is pressed, the magnet is pivoted away from the reed and the reed switch opens, causing the motor to be shut off.

B. Start Switch (2PB) (2, Fig. 14-1).

The start switch is a magnetically operated reed switch. When the start switch is in its normal position (not actuated) the reed switch on 2RMB (2, Fig. 14-2) behind the switch plate is open. When the switch is pressed to the START position, a magnet is positioned over the reed switch, thereby closing the contacts. The start switch is spring loaded (momentary) and will return to the open position when released.

C. Timer (3, Fig. 14-1).

The timer is mounted on the switch plate. It permits either continuous operation (Hold position) or up to 15 minutes of timed operation with automatic shut-off of the machine after the time set has elapsed. Timers with up to 60 minutes of timed operation are also available.

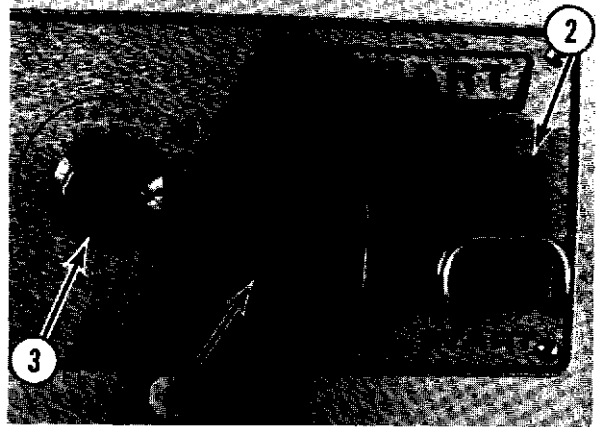


Fig. 14-1

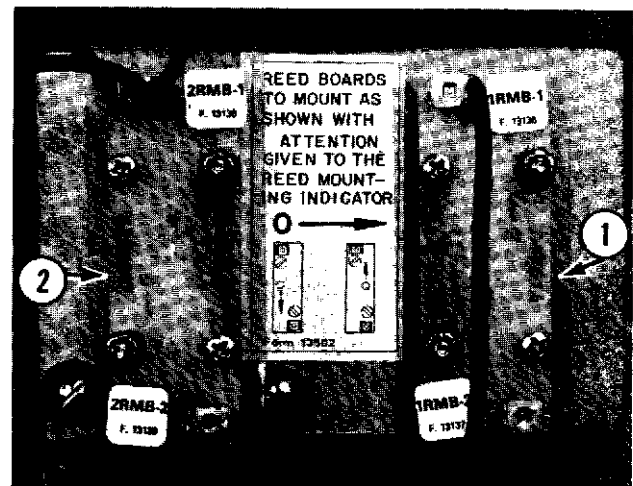


Fig. 14-2

2. Electrical Service Connection.

The electrical service is connected at the junction box located on the rear of the pedestal.

3. Motor Contactor (1, Fig. 14-3).

Leads L1 and L2 (and L3 if 3 Phase) from the junction box are connected to terminals L1 and L2 (and L3 if 3 Phase) on the contactor.

Leads T1 and T2 (and T3 if 3 Phase) from the contactor connect to the motor.

When the contactor is energized by the control circuit, contacts L1-T1, L2-T2 (and L3-T3 if 3 Phase) close and supply line voltage to the motor.

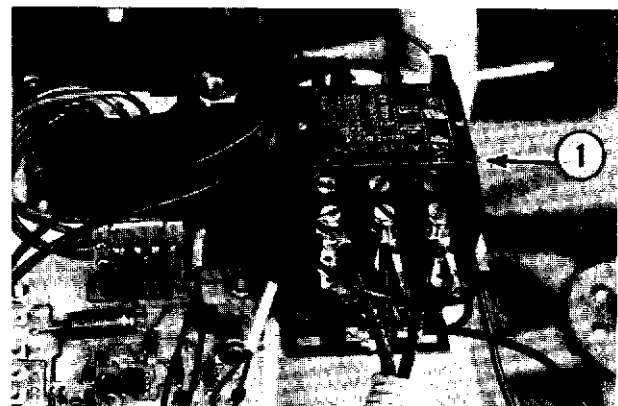


Fig. 14-3

4. Motor.

The V-1401 mixer uses a 5 hp Hobart built motor and the M-802 mixer used a 3 hp Hobart built motor.

The direction of rotation of the motor is clockwise as viewed from the pulley end of the motor.

A. Single Phase Motor.

The single phase motors are capacitor start type motors.

B. Three Phase Motor.

The three phase motors are squirrel cage induction type motors.

5. Fuse Board (1, Fig. 14-4).

A. 60 Hz.

Power is applied to L1 and L2 of the fuse board from terminals L1 and L2 on contactor 1CON. The fuses, 1FU and 2FU, protect the control transformer. On 60 Hz. machines the fuse board terminals H2 and H3 are for the jumper wires which properly connect the transformer primary to the input voltage.

- (1) Low voltage (200-230). When the line voltage is 200 or 230 volts, a jumper is connected between L1 and H3. Another jumper connects L2 and H2.
- (2) High voltage (460). When the line voltage is 460 volts, a single jumper is connected between H2 and H3.

6. Transformer and Power Input Board Assembly.

A. Transformer (1, Fig. 14-5).

- (1) 60 Hz. power is supplied through fuses 1FB and 2FB on the fuse board to the primary windings of the transformer. The transformer secondary windings provide 20VAC to the motor protector circuit and 120VAC to the control circuit.
- (2) 50 Hz.

On 50 Hz. machines, the transformer has quick connect terminals for high and low voltage connections. Terminals H2 and H3 on the fuse board are not used.

a. Low voltage 50 Hz. (220/50/3).

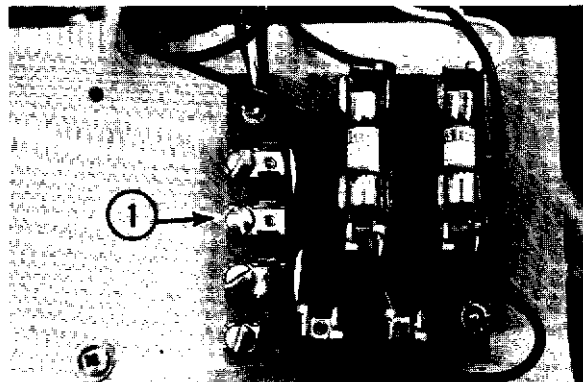


Fig. 14-4

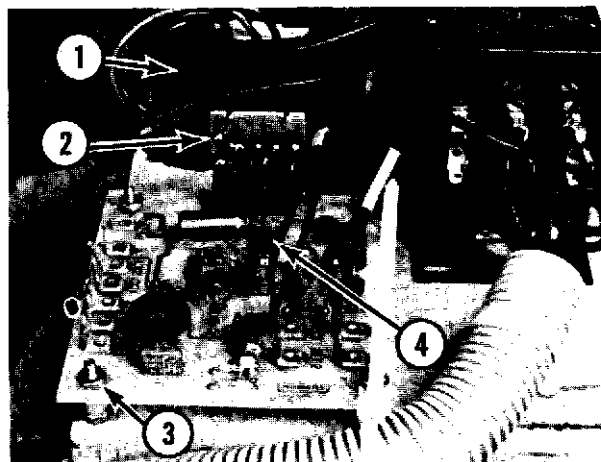


Fig. 14-5

When the line voltage is 220/50/3, a jumper connects L1 on the fuse board to H2B on the transformer. Another jumper connects L2 on the fuse board to H3B on the transformer.

b. High voltage 50 Hz. (380-415/50/3).

When the line voltage is between 380-415/50/3 a single jumper is connected between H2A and H3A on the transformer.

B. Power Input Board (2, Fig. 14-5).

- (1) The output voltages of the transformer are connected to the motor protector board through the power input board which plugs into a six pin connector on the motor protector board.
- (2) The power input board has a 3 amp fuse (3FU) in the 20 volt line to protect the motor protector circuit.

7. Motor Protector Board (3, Fig. 14-5).

If the motor should become overheated, the motor protector board will cause the contactor to de-energize and shut off the motor.

- A. There are two temperature sensors (thermistors) located in the motor windings. Thermistors change their resistance as the temperature around them changes.
- B. Thermistor 1QTM is connected between the two MT1 terminals on the motor protector board. 2QTM is connected between the MT2 terminals. As the motor temperature increases, the voltage across the MT1 (and MT2) terminals will decrease.
- C. If the motor is overloaded it will draw excessive current through its windings and the windings will become hotter. If the motor temperature should reach 285°F (140°C) the decreased voltage between the MT1 (or MT2) terminals will activate the motor protector circuit. The motor protector circuit then turns off the triac (electronic switch) located on the motor protector board, and the voltage is removed from the control circuit.
- D. Anytime an overheated motor is sensed the light emitting diode (LED) (4, Fig. 14-5) on the motor protector board will light.
- E. When the motor temperature drops to 257°F (125°C) the motor protector circuit will turn on the triac and allow the motor to be restarted. The LED will go out.

8. Electrical Sequence of Operation. Fig. 14-6.

NOTE: Refer to the electrical diagram on the machine when servicing a mixer with a voltage other than shown. Anytime that electrical power is connected to the machine, 120VAC from the transformer is present across terminals MPB-X1 and MPB-X2 (MPB-X2 is connected to 1CON-C3 through the triac on the MPB). 20VAC from the transformer is present across terminals LX1 and LX2 for use by the motor protector circuit. With time dialed into the timer, 1TM 6-7 is closed.

A. SET TIMER.

Timer motor and bowl light energized.

B. PRESS THE START SWITCH (2PB).

A completed circuit to the motor contactor coil (1CON) now exists through the switches 1PB, 1TM and 2PB. The contactor 1CON is energized.

C. 1CON ENERGIZES.

1CON contacts in the motor circuit close, applying line voltage to the motor and the motor starts. The 1CON side switch contacts (NO-C) also close. This provides an alternate circuit (locking circuit) to keep 1CON energized. The locking circuit is through the switches 1PB, 1TM and 1CON side switch.

The start switch can now be released. The motor will continue to run until the stop switch is pressed, or the timer contacts open.

D. PRESS THE STOP SWITCH.

1PB contacts open, interrupting the 120VAC circuit to the coil of 1CON and 1CON is de-energized.

E. 1CON DE-ENERGIZES.

1CON contacts in the motor circuit open, removing power to the motor. The 1CON side switch (NO-C) also opens which disables the locking circuit and makes it necessary to press the start switch to resume operation.

9. Electrical Troubleshooting.**A. General.**

The following procedures, when applied exactly, are designed to enable the technician to service this machine as quickly and effectively as possible. Never substitute electrical components without first analyzing the problem as this could result in damage to other components or only temporarily correcting the problem.

B. Check for Proper Voltages.

Several of the symptoms listed in this section can be caused by incorrect line voltages. Intermittent and/or unusual symptoms are often caused by incorrect voltages. It is good practice to check these voltages before troubleshooting components. If any of the following checks fail, see "Testing the Transformer" for further instructions.

- (1) Check for 120VAC between terminals MPB-X1 and MPB-X2 on the motor protector board. Voltage should be between 105 volts and 130 volts.
- (2) Check for 20VAC between terminals MPB-LX1 and MPB-LX2 on the motor protector board. Voltage should be between 18 and 22 volts.

C. Symptoms.

- (1) Electrical service circuit breakers kicking out when start switch is pressed.
 - a. Check for proper sizing of circuit breakers or line fuses and incorrect wiring to the machine.
 - b. Motor windings shorted. See "Testing Motor Field Windings".
 - c. Three phase motor single phasing. Check that all 3 legs of 3 phase power are present at terminals T1, T2 and T3 on 1CON when 1CON is energized.
 - d. Single phase motor has open start circuit. Check the start winding, start switch and capacitor in the motor.
 - e. Mechanical motor bind.
- (2) Machine won't start.
 - a. No power to machine from electrical service.

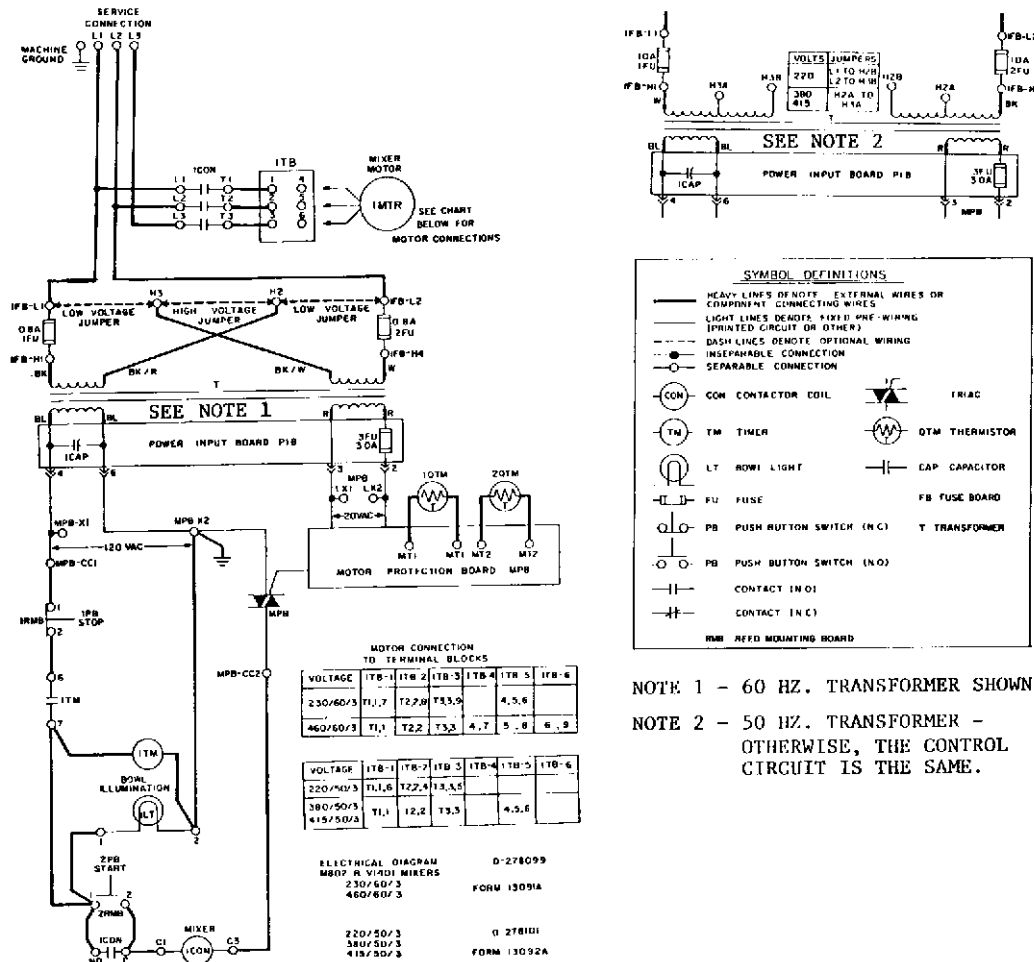


Fig. 14-6

- Fuses 1FU and/or 2FU blown.
 - Fuse 3FU (on PIB) blown. If after replacing F3, it blows again, replace the motor protector board.
 - Test transformer. See "Testing the Transformer".
 - Overheated motor (LED on motor protector board lit). See "Testing Motor Current".
 - Motor protector board malfunctions. See "Testing the Motor Protector Circuit".
 - Check reed switches 1PB, 2PB and timer contacts (ITM).
 - Motor contactor coil 1CON open.
- Machine starts when START switch is pressed but stops when START switch is released.
 - 1CON side switch not closing.
 - Motor hums (won't rotate).
 - Motor single phasing (3 Phase). Check that all 3 legs of 3 phase power are present at terminals T1, T2, T3 on 1CON when 1CON is energized.
 - Motor bearings frozen.
 - Terminal block ITB not wired correctly.
 - Start switch, capacitor, or start windings on single phase motor.
 - Motor field windings.

SECTION 15

ELECTRICAL CONTROLS (NON SOLID STATE)

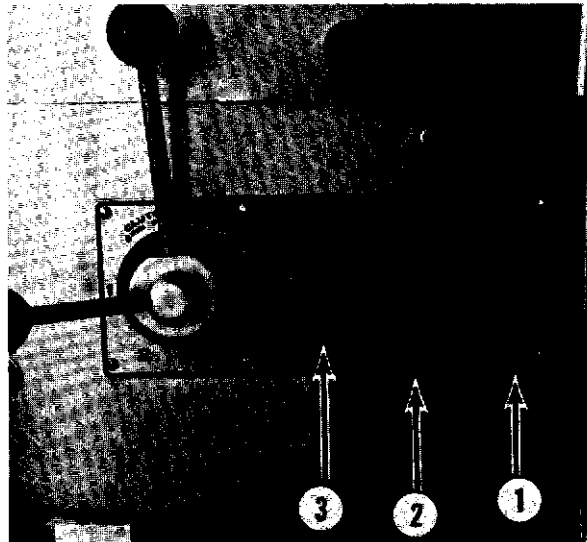


Fig. 15-1

1. Operating Controls.

A. Stop Switch (1, Fig. 15-1).

The STOP switch is a normally closed momentary switch. It is mounted on the contactor (right side) and is operated by depressing the stop button. When the mixer is running, depressing the STOP switch removes power to the control circuit.

B. Start Switch (2, Fig. 15-1).

The START switch is a normally open momentary switch. It is mounted on the contactor (left side) and is operated by depressing the start button. When the START switch is depressed, the contactor coil energizes.

C. Timer (3, Fig. 15-1).

The timer is mounted on the switch plate. It permits either continuous operation (Hold position) or up to 15 minutes of timed operation with automatic shut-off of the machine after the time set has elapsed. Timers with up to 60 minutes of timed operation are also available.

2. Electrical Service Connection.

The electrical service is connected at the junction box located on the rear of the pedestal.

3. Motor Contactor (Fig. 15-2).

Leads L1 and L2 (and L3 if 3 Phase) from the junction box are connected to terminals L1 and L2 (and L3 if 3 Phase) on the contactor.

Leads T1 and T2 (and T3 if 3 Phase) from the motor contactor connect to the motor.

When the contactor is energized by the control circuit, contacts L1-T1, L2-T2 (and L3-T3 if 3 Phase) close and supply line voltage to the motor.

The start switch and stop switch are also mounted on the contactor.

4. Motor.

The V-1401 mixer used a 5 hp Hobart built motor and the M-802 mixer uses a 2 hp Hobart built motor.

The direction of rotation of the motor is clockwise as viewed from the pulley end of the motor.

5. Transformer.

For voltage above 250V a reduced voltage pilot circuit transformer is supplied and is mounted below the contactor.

6. Sequence of Operation.

The schematic diagram, terminal and component locations are found on Fig. 15-3. Use the schematic in conjunction with the sequence of operation and also when troubleshooting the mixer. The wiring diagrams, such as Fig. 15-4 and Fig. 15-5 are found inside the top cover. They are normally used for point to point wire locations.

Anytime that the plug is connected to the electrical service outlet, power is applied to the control circuit. With the timer set to Hold or time set on the dial, the timer contacts (1TM) are closed.

A. PRESS THE START SWITCH.

A completed circuit to the motor contactor coil (ICON) lamp and timer motor, now exists through the stop switch, timer and the start switch. The contactor ICON is energized.

B. ICON ENERGIZES.

ICON contacts in the motor circuit close, applying line voltage to the motor and the motor starts.

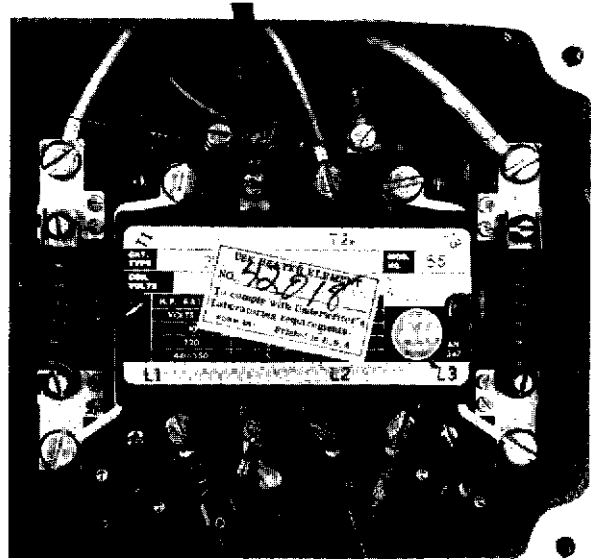


Fig. 15-2

The ICON C2 and C3 contacts also close. This provides an alternate circuit (locking circuit) to keep ICON energized. The start switch can now be released. The motor will continue to run.

C. PRESS THE STOP SWITCH.

The stop switch contacts open interrupting the voltage to the coil of ICON and ICON de-energizes.

NOTE: When time has expired on the timer, the timer contacts will open. This will also interrupt the voltage to the coil of ICON.

D. ICON DE-ENERGIZES.

ICON contacts in the motor circuit open, removing power to the motor. The ICON auxiliary contacts also open which disables the locking circuit and makes it necessary to press the start switch to resume operation.

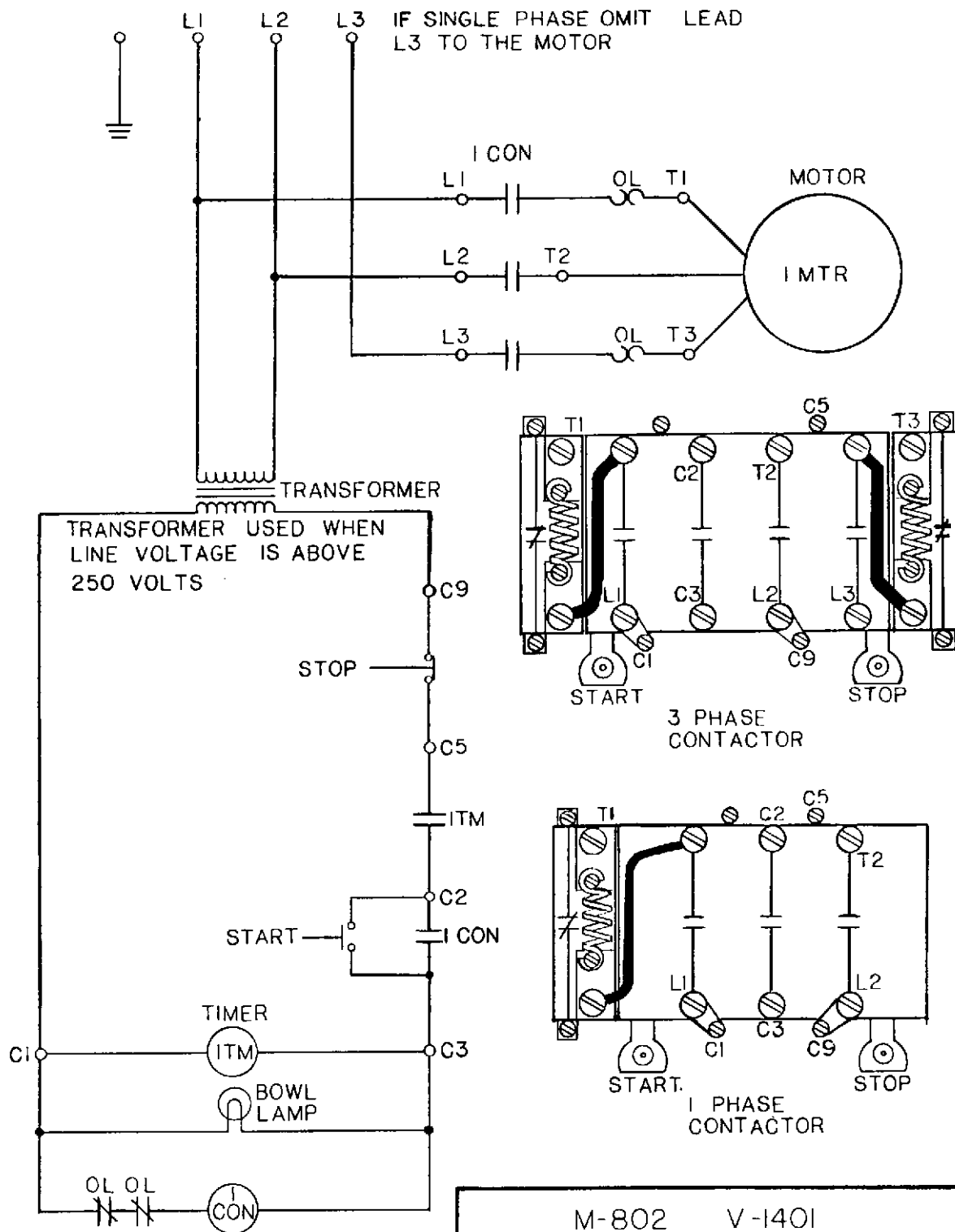


Fig. 15-3

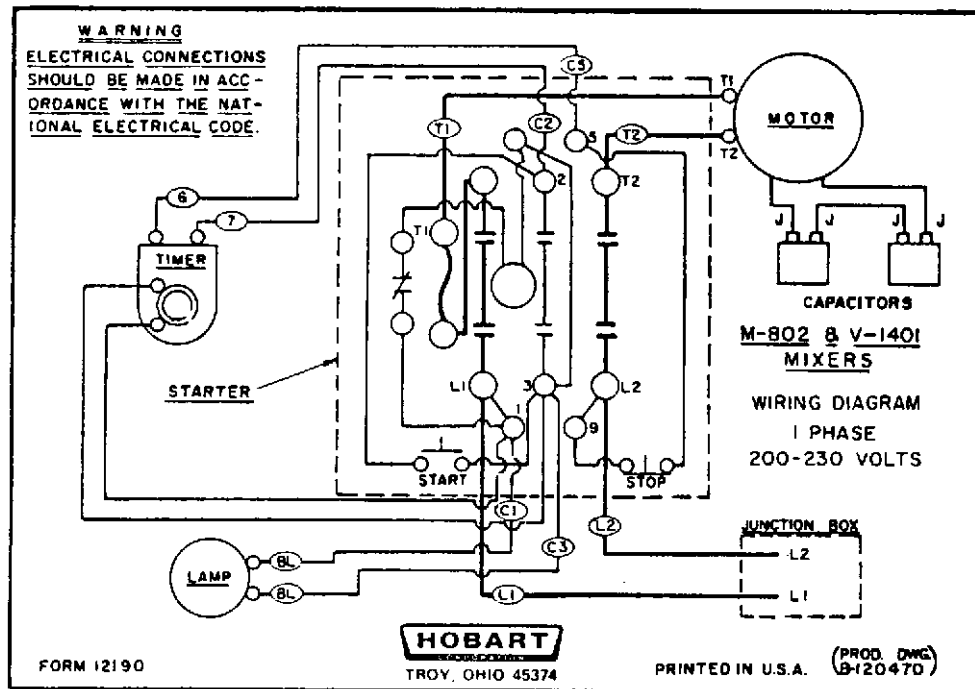


Fig. 15-4

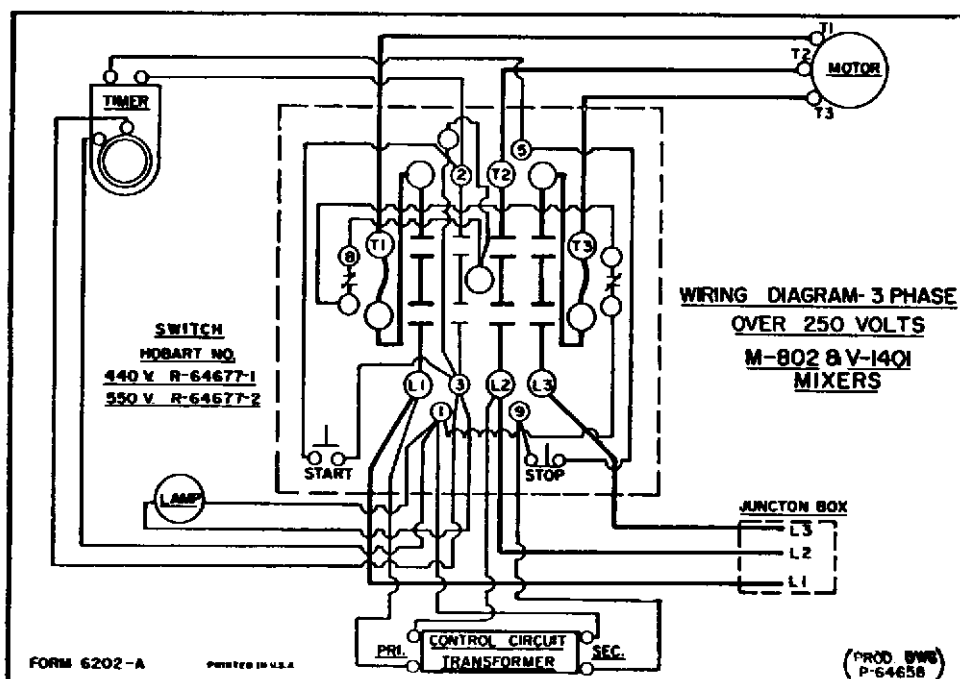


Fig. 15-5

7. Electrical Troubleshooting.

A. General.

Never substitute electrical components without first analyzing the problem as this could result in damage to other components or only temporarily correcting the problem.

B. Check for Proper Line Voltage.

Several of the symptoms listed in this section can be caused by incorrect line voltage. Intermittent and/or unusual symptoms are often caused by incorrect voltages. It is good practice to check the line voltage before troubleshooting components.

C. Symptoms.

- (1) Electrical service circuit breakers kicking out when start switch is pressed.
 - a. Check for proper sizing of circuit breakers or line fuses and incorrect wiring to the machine.
 - b. Motor windings shorted. See "Testing Motor Field Windings".
 - c. Three phase motor single phasing. Check that all 3 legs of 3 Phase power are present at terminals T1, T2 and T3 on 1CON when 1CON is energized.
 - d. Single phase motor has open start circuit. Check the start windings, start switch and capacitor in the motor.

e. Mechanical motor bind.

(2) Machine won't start.

- a. No power to machine from electrical service.
- b. Overloaded motor. (Overload relay tripped) See "Testing Motor Current".
- c. Check stop switch, timer and start switch.
- d. Motor contactor coil 1CON open.
- e. Test transformer (if equipped). (Proper voltage between C1 and C9 on contactor.)

(3) Machine starts when START switch is pressed but stops when switch is released.

- a. 1CON C2/C3 contacts not closing.

(4) Motor hums (won't rotate).

- a. Motor single phasing (3 Phase).

Check that all 3 legs of 3 Phase power are present at terminals T1, T2, T3 on 1CON when 1CON is energized.

- b. Motor bearings frozen.

SECTION 16 TESTING

1. Testing the Transformer (Solid State Mixer).

A. The transformer provides the necessary voltage to power the control circuits.

- (1) 120VAC to power the motor contactor coil, timer motor and the bowl light.
- (2) 20VAC to power the motor protector circuit.

B. Check the input voltage to the transformer primary between terminals L1 and L2 (1, Fig. 16-1) on the fuse board.

- (1) The transformer input voltage should agree with the line voltage which is specified on the machine data plate.

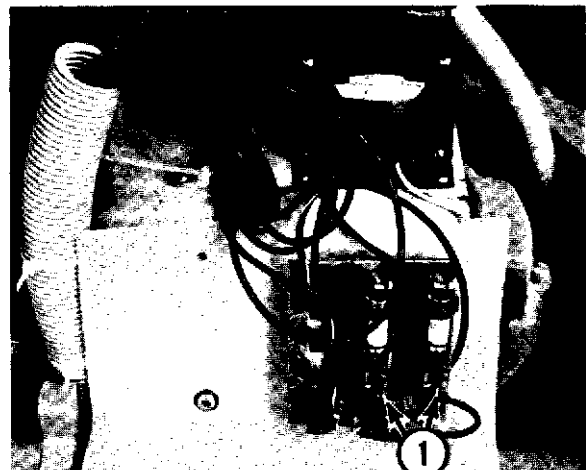


Fig. 16-1

C. Check the transformer output voltage.

- (1) Check for 120VAC (105 to 130VAC) between terminals X1 and X2 (1, Fig. 16-2) on the motor protector board.
- (2) Check for 20VAC (18 to 22VAC) between terminals LX1 and LX2 (2, Fig. 16-2) on the motor protector board.

D. Testing for incorrect transformer output voltage.

(Input voltage reading is correct.)

(1) BOTH OUTPUT VOLTAGE READINGS (120VAC X1 and X2, 20VAC LX1 and LX2) ARE INCORRECT.

- a. Check fuses 1FU and 2FU. (Remove the fuses and check for continuity.)
- b. Check that HIGH or LOW jumpers on the fuse board are connected properly.
- c. If the jumpers are connected properly, replace the transformer.

(2) 120VAC (between X1 and X2) IS NOT CORRECT. 20VAC (between LX1 and LX2) IS CORRECT.

- a. Replace the transformer.

(3) 20VAC (between LX1 and LX2) IS NOT CORRECT. 120VAC (between X1 and X2) IS CORRECT.

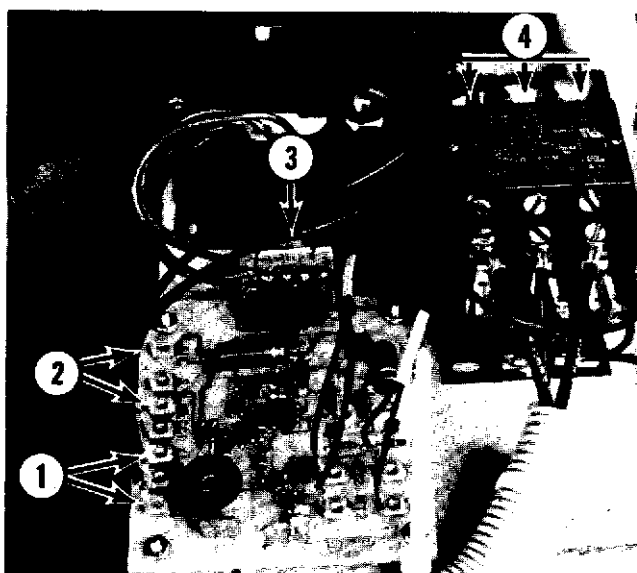


Fig. 16-2

- a. Disconnect the power cord, unplug the power input board (3, Fig. 16-2) and check the fuse (3FU) on the power input board with an ohmmeter.
- b. If the fuse is open, replace it. Plug the power input board back into the motor protector board and reconnect the power cord. Run the machine. If the fuse should blow again, replace the motor protector board and the fuse.
- c. If the fuse on the power input board checked good, and the 20VAC reading is not correct, replace the transformer.

2. Testing Motor Current.

A voltage check should always be made before attempting to test the motor current. To check the voltage and motor current, use a Triplet Model 630 H volt ohmmeter and a Model 10 AC amp adapter, or similar tester.

NOTE: If the motor will not run, refer to Electrical Troubleshooting "Machine Won't Start" and check the switches 1PB, 2PB, 1TM and contactor 1CON.

If the LED on the motor protector board is lit, refer to "Testing The Motor Protector Circuit".

- A. Start the mixer and test the voltage on the load side of the contactor (4, Fig. 16-2) solid state mixers and (1, Fig. 16-3) non solid state mixers, between terminals:

1 Phase	3 Phase
T1 - T2	T1 - T2, T1 - T3 T2 - T3

- B. The voltage readings should be the same values as specified on the machine data plate. If they are not, the contactor or the line voltage has a malfunction and must be corrected before proceeding.

NOTE: The voltage must be correct before proceeding with the current (amp) check.

- C. Clamp the amp tester around motor lead T1. (See 4, Fig. 16-2 if solid state or 1, Fig. 16-3 if non solid state.)
- D. Set the amp tester to the 60 amp range.
- E. Start the machine and take a reading. If the mixer is 3 phase, check the other two motor leads (T2-T3) in the same way. It may be necessary to select a lower setting on the meter to get a more accurate reading.

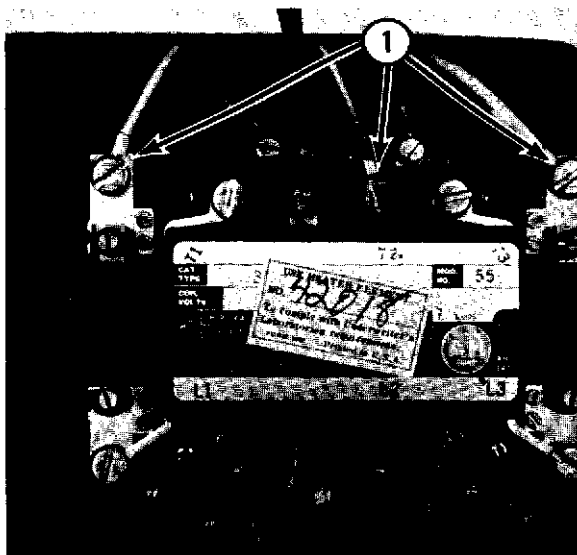


Fig. 16-3

F. The rated motor current is:

NOTE: Because of various methods used to rate motor horsepower, the M-802 motor rating has been changed from 2 hp to 3 hp. The motor performance is the same.

60 Hz.

	1 Phase		3 Phase		
	200V	230V	200V	230V	460V
M-802 (2 hp)	16.0	14.5	7.9	7.5	3.7
M-802 (3 hp)	21.0	18.0	10.5	8.8	4.4
V-1401 (5 hp)	31.0	27.5	14.4	13.6	6.8

50 Hz.

	220V	380V	415V
M-802 (2 hp)	6.0	3.9	3.6
M-802 (3 hp)	10.2	5.9	5.4
V-1401 (5 hp)	13.5	7.8	7.2

Intermittent, short term overload current no greater than 20% of the rated current is acceptable.

Continuous current above the rated current and intermittent overload current greater than 20% of the rated current indicates an overloaded or malfunctioning motor.

It should also be noted that when an amp test is being made on a mixer which is pulling no load, the current will be less than the rated current.

3. Testing Motor Field Windings.

Due to the many different types of motors used in these mixers, it is not practical to list all the various resistance readings. Generally, when checking windings for resistance, you should obtain a reading between .2 (2/10) and 5 ohms. When checking between any lead and chassis, any reading above 500,000 ohms is acceptable.

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING WORKED ON.

A. Disconnect the motor leads.

NOTE: On single phase capacitor start motors it will be necessary to remove the bearing bracket to check the start windings.

B. With an ohmmeter, check the windings for proper resistance.

Refer to Fig. 16-4 Single Phase Capacitor Start.

Fig. 16-5 Three Phase (Single Voltage 60 Hz.).

Fig. 16-6 Three Phase (Dual Voltage 60 Hz.).

C. If readings are unacceptable, refer to TSB 445A or parts catalog for necessary repair parts.

D. Connect the motor leads as described in the Mechanical Service Section "Installing the Motor".

SINGLE PHASE CAPACITOR START

M-802

200/60/1	ML-31405-B
230/60/1	ML-31405-C
200/60/1	ML-40508-B
230/60/1	ML-40508-C

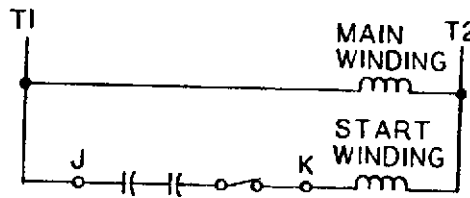
V-1401

200/60/1	ML-31406-B
230/60/1	ML-31406-C
200/60/1	ML-40507-B
230/60/1	ML-40507-C

RESISTANCE OF WINDINGS TEST

With ohmmeter set on RX1, check for resistance between leads:

T1-T2
K-T2

GROUNDING STATOR TEST

With ohmmeter set on RX 100,000, check for short between:

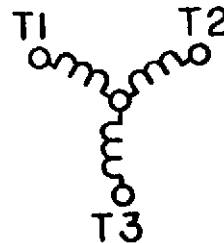
T1-Chassis
T2-Chassis

Fig. 16-4

THREE PHASE (SINGLE VOLTAGE 60 HZ)

M-802

200/60/3	ML-31405-F
230/60/3	ML-31405-G
460/60/3	ML-31405-H
220/50/3	ML-31405-N
380/50/3	ML-31405-P
575/60/3	ML-31405-AG
415/50/3	ML-31405-AD
200/60/3	ML-40508-F
575/60/3	ML-40508-AG



V-1401

200/60/3	ML-31406-F
230/60/3	ML-30406-G
460/60/3	ML-31406-H
220/50/3	ML-31406-N
380/50/3	ML-31406-P
575/60/3	ML-31406-AG
415/50/3	ML-31406-AD
200/60/3	ML-40507-F
575/60/3	ML-40507-AG

RESISTANCE OF WINDINGS TEST

With ohmmeter set on RX1, check for resistance between leads:

T1-T2
T1-T3
T2-T3

GROUNDING STATOR TEST

With ohmmeter set on RX 100,000, check for short between:

T1 - Chassis
T2 - Chassis
T3 - Chassis

Fig. 16-5

THREE PHASE (DUAL VOLTAGE 60 HZ)

M-802

230/460/60/3 ML-40508-DB

V-1401

230-460/60/3 ML-40507-DB

RESISTANCE OF WINDINGS TEST

With ohmmeter set on RX 1,
check for resistance
between leads:

T1-T4
T2-T5
T3-T6
T7-T9
T7-T8
T8-T9

GROUNDING OR SHORTED STATOR TEST

With ohmmeter set on RX 100,000,
check for short between:

T1 - Chassis
T2 - Chassis
T3 - Chassis
T7 - Chassis
T1-T2
T1-T3
T2-T3
T1-T7
T2-T7
T3-T7

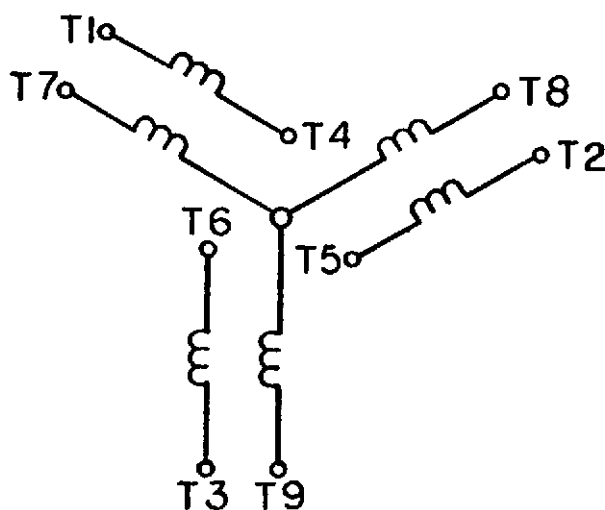


Fig. 16-6

4. Testing the Motor Protector Circuit (Solid State Mixer).

A. The normal functions of the motor protector circuit are:

- (1) Allows current to flow to the contactor coil (1CON). (LED not lit.)
- (2) Interrupts the current to the contactor coil (1CON) if the motor becomes too hot. (LED will light.)
- (3) Interrupts the output current to the contactor coil (1CON) if a motor thermistor becomes open or shorted. (LED will light.)

B. Testing the normal functions of the motor protector board.

If any of the following checks fail, replace the motor protector board.

NOTE: Current production machines have a ground wire connected between terminal MPB-X2 (in addition to the existing MPB-X2 wire) and one of the four motor protector board mounting bolts (machine ground). Early production machines without the ground wire may give a false indication or the motor protector board may be damaged when the following tests are performed. If the machine which you are servicing is an early production unit, install

the ground wire (using #16 AWG wire, green with yellow stripe, 600 VAC 105 °C insulation 4" long with #6 stud ring terminal on one end and 3/16" piggy-back quick terminal connect on the other) before proceeding with "Testing The Motor Protector Circuit".

- (1) Start the machine.
- (2) Short across the two MT1 terminals with a jumper wire. The motor should stop and the LED should light.
- (3) Restart the machine and short across the two MT2 terminals. The motor should stop and the LED should light.
- (4) Restart the machine and open the MT1 circuit by disconnecting a lead to one of the MT1 terminals. The motor should stop and the LED should light. Reconnect the lead.
- (5) Restart the machine and open the MT2 circuit by disconnecting a lead to one of the MT2 terminals. The motor should stop and the LED should light. Reconnect the lead.

C. Testing for a motor protector circuit malfunction. (LED lit, motor will not run.) Be sure that the LED is not lit due to the mixer being overloaded.

Tools required are:

Two 10,000 ohm 1/4 watt resistors with spade lugs attached to the leads.

Amp meter.

- (1) Before making the following tests make sure the transformer output voltages are correct. Refer to: "Testing Transformer".
- (2) Substitute 10,000 ohm resistors for 1QTM and 2QTM thermistors.
 - a. Disconnect the leads from the two MT1 terminals and the two MT2 terminals on the motor protector board.
 - b. Connect a 10,000 ohm resistor across the two MT1 terminals and a 10,000 ohm resistor across the two MT2 terminals on the motor protector board.
- (3) If the LED did not go out, replace the motor protector board (MPB).

- (4) If the LED went out, perform a motor current test to determine if the motor is operating properly. Replace the motor as required if the amperage is not within limits. Do not operate the motor any longer than necessary when performing the current test. Refer to "Testing Motor Current".
- (5) If the motor current is within limits, shut off the mixer and turn off power to the machine.
- (6) With an ohmmeter, test the resistance of 1QTM and 2QTM motor temperature sensors (Thermistors).
- (7) Refer to the chart and determine if the thermistor resistance is correct. Both thermistors should have approximately the same resistance reading. The temperature of the stator windings (where the thermistors are located) will usually be higher than the outside temperature of the stator.

MOTOR TEMPERATURE		THERMISTOR RESISTANCE
77 °F	=	100,000 ohms
100 °F	=	56,000 ohms
120 °F	=	35,000 ohms
140 °F	=	22,500 ohms
160 °F	=	14,500 ohms
180 °F	=	10,000 ohms
200 °F	=	6,800 ohms
220 °F	=	4,800 ohms
240 °F	=	3,400 ohms
260 °F	=	2,500 ohms
280 °F	=	1,850 ohms
300 °F	=	1,360 ohms

- (8) If the thermistor(s) resistance is not correct, replace the stator.
- (9) Remove the 10,000 ohm resistors from the motor protector board and reconnect the thermistor leads.

NOTES

NOTES

Insert Classif. of TMDER Here and At Bottom of Page) CLASSIFICATION:

NAVSEA (USER) TECHNICAL MANUAL DEFICIENCY/EVALUATION REPORT (TMDER)
(NAVSEA S0005-AA-GYD-030/TMMP & NAVSEAINST 4160.3)

INSTRUCTIONS: Insert classification at top and bottom of page. Read the following before completing this form. Continue on 8½" x 11" paper if additional space is needed.

USE THIS REPORT TO INDICATE DEFICIENCIES, USER REMARKS, AND RECOMMENDATIONS RELATING TO PUBLICATION. BLOCKS MARKED WITH "*" ARE TO BE FILLED IN BY THE CONTRACTOR BEFORE PRINTING. FOR UNCLASSIFIED TMDER'S, FILL IN YOUR RETURN ADDRESS IN SPACE PROVIDED ON THE BACK, FOLD AND TAPE WHERE INDICATED. AND MAIL. (SEE OPNAVINST 5510.1 FOR MAILING CLASSIFIED TMDER'S)

NAVSEA NO. ★		2. VOL. PART ★		3. TITLE ★	
REV. DATE OR TM CH. DATE		5. SYSTEM/EQUIPMENT		6. IDENTIFICATION/NOMENCLATURE (MK/MOD/AN)	
7. USER'S EVALUATION OF MANUAL (Check Appropriate blocks)					
A. EXCEL- LENT	B. GOOD	C. FAIR	D. POOR	E. COM- PLETE	F. INCOM- PLETE

GENERAL COMMENTS

9. RECOMMENDED CHANGES TO PUBLICATION

E	PARA- GRAPH B.	LINE NO. C.	FIG. NO. D.	TABLE E.	F. RECOMMENDED CHANGES AND REASONS

ORIGINATOR AND WORK CENTER (PRINT)	11. ORIGINATOR'S RANK, RATE OR GRADE, AND TITLE	12. DATE SIGNED
SIGNATURE OF WORK CENTER HEAD	14. SIGNATURE OF DEPARTMENT OFFICER	15. AUTOVON/COMM. NO.

HIP HULL NO. AND/OR STATION ADDRESS (DO NOT ABBREVIATE)

17. THIS SPACE ONLY FOR NSDSA

CONTROL NO	B. COG ISEA	C. DATE			D. PRIORITY	E. TRANSMITTED TO
		RECEIVED	FORWARDED	DUE		

CLASSIFICATION:

Fold Here

DEPARTMENT OF THE NAVY



Official Business
Penalty for Private Use \$300

COMMANDING OFFICER
NAVAL SHIP WEAPON SYSTEMS ENGINEERING STATION
NAVAL SEA DATA SUPPORT ACTIVITY (Code 5H00)
PORT HUENEME, CA 93043-5007

Fold Here

NAVSEA/SPAWAR TECHNICAL MANUAL DEFICIENCY/EVALUATION REPORT (TMDER)

INSTRUCTIONS: Continue on 8 1/2" x 11" page if additional space is needed.

1. Use this report to indicate deficiencies, problems and recommendations relating to publications.

2. For CLASSIFIED TMDERs see OPNAVINST 5510H for mailing requirements.

3. For TMDERs that affect more than one publication, submit a separate TMDER for each.

4. Submit TMDERs at web site <http://nsdsa.phdnswc.navy.mil> or mail to: **COMMANDER, CODE 310 TMDER BLDG 1388, NAVSURFWARCENDIV NSDSA, 4363 MISSILE WAY, PORT HUENEME CA 93043-4307**

1. PUBLICATION NUMBER	2. VOL/PART	3. REV/DATE OR CHG/DATE	4. SYSTEM/EQUIPMENT ID
5. TITLE OF PUBLICATION			6. REPORT CONTROL NUMBER (6 digit UIC-YY-any four: xxxxxx-03-xxxx)

7. RECOMMEND CHANGES TO PUBLICATION

7a. Page #	7b. Para #	7c. RECOMMENDED CHANGES AND REASONS

8. ORIGINATOR'S NAME AND WORK CENTER	9. DATE	10. ORIGINATOR'S E-MAIL ADDRESS	11. TMMA of Manual (NSDSA will complete)
12. SHIP OR ACTIVITY Name and Address (include UIC/CAGE/HULL)		13. Phone Numbers: Commercial () ____ - ____ DSN ____ - ____ FAX () ____ - ____	

